FLIGHT
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Founder and Editor: STANLEY SPOONER

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Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

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Dec. 3-19 .... Paris Aero Show
Dec. 9 .... Captain F. Entwistle, B.Sc. "Wind Structure in Relation to Air Navigation," before Inst.Ae.E.
Dec. 16 .... Wing-Comdr. C. D. Breeze, A.F.C., R.A.F. "The Training of Aircraft Apprentices," before R.Ae.S.

EDITORIAL COMMENT.

CERTAIN events in aviation have in the course of time attained a position of eminence which could not originally have been foreseen, which cannot now be explained on logical grounds, but which is yet generally admitted and even taken for granted. The Gordon Bennett race was one such event, in the realm of air racing. It was followed by the Coupe Deutsch. The Coupe Beaumont has never equalled these two, nor, in our opinion, will it ever do so. The seaplane race for the Schneider Cup is another such event. Beginning modestly, and donated with prizes which, although substantial at the time they were first offered, are certainly far from extravagant, this race has become *the* seaplane race of the world, and the Schneider Trophy is, perhaps, more intensely coveted than any other similar trophy. Why is it? Nobody appears to be able to supply the answer. The fact remains, however, that the nations have spent vastly more money on securing this trophy than has ever been spent on any other air race. Had the Americans won the race this year there would have been an end to the Schneider Cup race, and it is extremely doubtful if any new trophy or prize, even if of vastly greater value, would ever quite have taken the place of the Schneider Cup. Thus it is probably the very best thing that could have happened to aviation that Lieut. de Bernardi, on behalf of Italy, lifted the Cup at Norfolk, Va.

The Paris Aero Show

Among aero exhibitions, that in the Grand Palais, Champs Elysees, provides yet another example of an event the importance of which has grown with the years, until it is safe to say that no other aero Show in the world equals the French in importance. Again one is prompted to ask why is it? Certainly the Paris aero Shows were among the first in the world, if not indeed the very first aero Show of all was one at Paris, but this in itself does not necessarily explain why it is that the Paris Aero Show of modern times is *the* exhibition event. Yet we think there are few who will seriously deny that this is so. Is it that at the Grand

Palais such a tremendous amount of business is done? Frankly, we doubt it. A certain number of orders are doubtless booked there, but the greater part of the business of selling and buying aircraft is, we feel sure, done as an indirect rather than as a direct result of the Shows. How is it, then, that the Paris Aero Show has come to occupy such a prominent position? It is probably to be accounted for as being one of those cases of mass psychology which cannot be explained but which must be accepted. And furthermore, without a doubt the Paris Show, quite irrespective of the quality of its exhibits, does draw together representatives of all the nations in the world which are at all seriously interested in aviation in any of its phases. That, to our way of thinking, is the real value of the Paris Aero Show. One meets there all the people that matter in the aviation world; old friendships are renewed, new friends are made, and "shop" is talked in a congenial atmosphere from morning till night. If, at the same time, the machines exhibited show any real progress, any clever features, or inspire fresh lines of thought, so much the better.

If the psychological side of the Paris Aero Show is somewhat intangible, the technical is plain enough, and in the present issue of FLIGHT we have attempted to place before our readers brief particulars of all the aircraft to be exhibited there. We fear that in this we have not, perhaps, been entirely successful inasmuch as we should hesitate to claim that the following pages contain complete data of *all* the machines which visitors to the Grand Palais will have an opportunity of seeing. We believe, however, that we can claim to have succeeded in collecting together brief specifications of something over 90 per cent. of the exhibited aircraft. In view of the difficulty of obtaining—especially in France—advance information before the opening of an aero exhibition, we feel that to have managed to extract from some 30 firms of reticent aircraft constructors data relating to their exhibition machines is by way of being a small achievement, and we trust the data, although not very exhilarating reading, will not be found to be without interest. In many cases the performance data given are those officially checked by the French *Section Technique*, and should thus be reliable.

A feature of this year's Paris Show is the number of machines which have either "made history" in some way or other by meritorious flights, or the performance of which has been verified by the S.T.A. There is scarcely a machine exhibited which has not thus proved itself, and to this extent, therefore, the 1926 Show can be said to be an improvement over previous ones. Furthermore, it can, we think, be said that there will not, this year, be a single "freak" at the Show. While this fact may detract somewhat from the gaiety of nations, it is, on the other hand, a definite proof of solid, if less spectacular, progress.

A noteworthy feature of the Show will be found to be the increasing use of metal, and more particularly Duralumin, as an aircraft construction material. This is not to say that wood has disappeared altogether, nor that it promises to do so immediately. In fact, several firms, notably among the old-established firms such as Farman and Caudron, still retain wood construction. But the number of firms having seriously turned their attention to metal is obviously increasing, much as is the case in this country.

British participation in the Paris Aero Show is very limited, the only firm to exhibit aircraft being Sir W. G. Armstrong-Whitworth Aircraft, Ltd., who are showing one of their "Ajax" two-seaters, with Armstrong-Siddeley "Jaguar" engine. Armstrong-Siddeley Motors are exhibiting a full range of aero engines: the "Genet," "Mongoose," "Lynx" and "Jaguar," of which the "Mongoose" is a new type and will be seen at Paris for the first time. The Bristol Aeroplane Company are showing their three types of engines: the "Cherub," the "Lucifer" and the "Jupiter." While on the subject of the latter engine, we would call attention to the amazing number of machines at the Show fitted with the "Jupiter." In most cases, of course, these are the "Jupiters" built under licence by the Gnome-Rhone Company, but as the country of origin of the Bristol "Jupiter," Britain may justly take a pride in the popularity of this engine, to which its extensive use bears testimony.

In this week's issue of FLIGHT will be found a special section dealing with British aircraft firms and their products. Although it is obviously impossible to give, in 24 pages, a comprehensive review of the British aircraft industry, it is hoped that the special section will be found useful as an indication of what is being done in Great Britain. A somewhat serious handicap is imposed by the fact that British Air Ministry regulations do not permit performance figures of modern British aircraft being published, so that a direct comparison, in this respect, cannot be made with the French and other machines of which particulars are given in this issue. Generally speaking, however, it may be taken for granted that, class for class, type for type, and power for power, British machines need not fear comparison with any exhibited in the Grand Palais.

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Aerial Triptyques

CUSTOMS Passes, serving the same purpose as motor-car triptyques, but without the triptyques' chief disadvantage, have recently been introduced by the Royal Aero Club for the benefit of British airmen abroad and private owners of aircraft touring the Continent. With motor-car triptyques a substantial sum of money is required to be deposited as a security before the car can leave the country, but these new customs passes for aircraft, known as "carnets de passage en douanes," save the aerial tourist all this inconvenience. A "carnet," procurable from the Royal Aero Club at a cost of only £1 11*s.* 6*d.*, serves as a customs pass on foreign aerodromes, and relieves the holder of all troublesome formalities, including the necessity of making a cash deposit, as has been required hitherto. The "carnet" is in the form of a paper-covered book with detachable sheets and counterfoils, and is applicable to balloons, aeroplanes, seaplanes, amphibians, and helicopters. It is officially recognised by Great Britain, Belgium, France, Italy, Holland, Roumania and Switzerland, and carries the guarantee of the Aero clubs of 25 nations. A number of British private owners and taxi-pilots, including all the pilots of Capt. Lowenstein's private air fleet, have been using these "carnets" for some time past, and one of the latest applicants was Flight-Lieut. J. S. Chick, the Harlequin Rugby footballer, who is spending his honeymoon touring the South of France with his wife in a light aeroplane.

World's Records

THE Royal Aero Club has received notification of the following world's records from the Federation Aeronautique Internationale:—

Height with 1,000 *kgs. of Merchandise.*—V. Gronau (Germany) on Heinkel seaplane, 450 h.p. Napier "Lion," November 2, 1926, 4,492 m. (14,738·25 ft.).

Height with 500 *kgs. of Merchandise.*—Capt. E. L. Tornberg (Germany) on Heinkel seaplane, 450 h.p. Napier "Lion," November 10, 1926, 5,731 m. (18,803·4 ft.).

FLIGHT

The PARIS AERO SHOW 1926

In the following pages of this week's issue of FLIGHT *will be found particulars and illustrations of practically all the aircraft to be exhibited at the Paris Aero Show which opens at the Grand Palais, Champs Elysees, to-morrow, December 3. This advance report deals, in so far as it has been possible to obtain the necessary material, mainly with the general characteristics of the machines exhibited, the purpose for which they were designed, the engines with which they are fitted, the main dimensions of the machines, and their performances. No attempt has been made to give very detailed descriptions of constructional features, as it is intended to return to these in subsequent issues. In the meantime the following notes and illustrations should serve as a very useful guide to those visiting the Paris Aero Show, as well as giving a fairly complete indication to those not able to visit the Salon of the general trend of European aircraft development as represented by the machines on view in the Grand Palais.*

ARMSTRONG-WHITWORTH

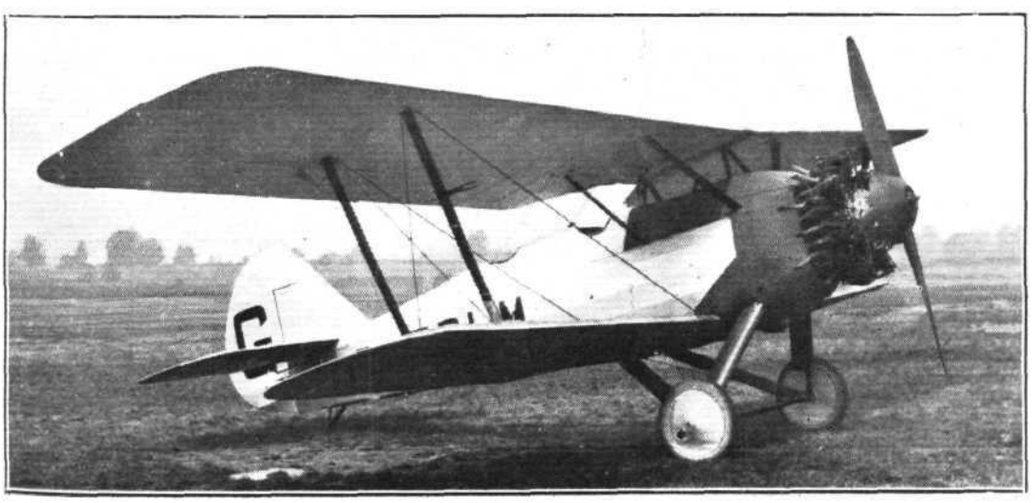
THE British firm of Armstrong-Whitworth is so well known throughout the world that there is no necessity here to mention its various products. *Sir W. G. Armstrong-Whitworth Aircraft, Ltd,* is a branch of the parent company and devotes its energies exclusively to aircraft construction, while its allied company, *Armstrong-Siddeley Motors, Ltd.,* produces the famous aero engines "Jaguar," "Lynx," "Mongoose," and "Genet."

At the Paris Aero Show particular interest will attach to the Armstrong-Whitworth exhibits, since this is the only British firm to show aircraft. In addition to the aeroplane to be exhibited, the Armstrong-Siddeley firm will exhibit their complete series of engines, of which the "Mongoose" is an entirely new type and will make its public appearance for the first time at Paris. Having placed on record the fact that the Siddeley aero engines will be on view, we must defer a more detailed reference until next week, the present issue of FLIGHT being devoted exclusively, as far as the Paris Aero Show is concerned, to aircraft.

The aeroplane to be exhibited on the Armstrong-Whitworth stand is the "Ajax," a two-seater general-purpose aeroplane, fitted with the Armstrong-Siddeley "Jaguar" engine. This machine, which can be used either as a general purpose reconnaissance machine or as a two-seater fighter, may be said to be the two-seater development of the "Siskin" family with which our readers are already familiar. It is characterised by a very compact form and an excellent speed range, as well as by good controllability at all speeds. The normal load of the machine is 400 kgs., and fuel for a range of 800 kms. at cruising speed. This may be increased by 120 kgs. for special purposes. The top speed of the "Ajax" is 225 km./h. and the ceiling with normal load is 6,000 metres.

The engine normally fitted is the Armstrong-Siddeley "Jaguar" of 385 h.p. If a higher performance is required, or particularly a higher ceiling, the supercharged engine of the same type may be used. The "Jaguar" engine is entirely accessible. Inspection and running adjustments are easily made. A fireproof bulkhead is fitted behind the engine. Petrol and oil filters of ample size are provided in accessible positions. The petrol is fed from a gravity tank divided into two compartments, mounted inside the fuselage. Reference has already been made to the good controllability, which extends right down to, or beyond, the stalling angle, and the machine can be flown indefinitely without the use of controls, being very stable as well as manœuvrable.

The undercarriage is of the type in which the shock of alighting is taken by an oil buffer so as to relieve the frame of



The Armstrong-Whitworth "Ajax": A two-seater general purpose aeroplane with "Jaguar" engine. Can be fitted with float undercarriage.

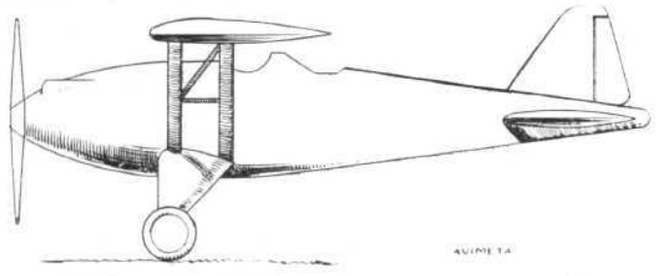
undue stresses, and to prevent bouncing. The tail skid is controlled by the rudder bar, so that the machine can be steered with accuracy on the ground.

Specification of Armstrong-Whitworth "Ajax":—Weight empty, 1,018 kgs.; fuel and oil, 262 kgs.; military load, 400 kgs.; total loaded weight, 1,680 kgs. Speed at ground level, 225 km./h.; speed at 3,000 m., 220 km./h.; slow speed, 95 km./h. Climb to 3,000 m. in 11 mins. Climb to 5,000 m. in 24 mins. Ceiling, 6,000 m. Endurance at a cruising speed of 200 km./h. 4 hours. Range 800 kms.

AVIMETA

THE *Société pour la Construction dAvions Métallique "Avimeta,"* with offices in Paris and Works in Courbevoie (Seine), is the outgrowth of the former Aeronautical Department of the Schneider-Creusot armament firm, in which Captain Georges Lepère and M. André Lesage are associated as before.

The new firm exhibits at the *Salon* its AVM 88 two-seater reconnaissance-fighter, fitted with a 595 h.p. Hispano-Suiza engine. This is a strut-braced semi-cantilever monoplane, which incorporates an excellent streamline and is entirely built of the Schneider light alloy *Alférium*. The wing spars are lattice girders. The fuselage is of square cross section with rounded corners, and is built up on four longerons and a number of formers which are braced by a trellis work. Both wings and fuselage are covered with sheet *Alférium*, which is



The Avimeta AVM 88 is a two-seater reconnaissance-fighter with Hispano Engine

riveted to the framing and is externally ribbed for local stiffness.

The undercarriage consists of two independent, faired sheet metal frames, with no axle between them, which carry each a wheel sprung by rubber chords housed inside the body of the wheel.

The petrol tank, which has a capacity of 420 litres, is of the S.E.M.A.P.E. crash-proof type and can be jettisoned in flight. The oil tank has a capacity of 40 litres.

The armament consists of two synchronised guns, two wing guns and two flexible guns on a ring mount. Each gun is provided with 500 rounds of ammunition.

Specification.—Engine: 500 h.p. Hispano-Suiza. Span: 17·00 m. Length: 9·76 m. Height: 3·55 m. Wing area: 40 sq. m. Weight, empty: 1,550 kgs. Fuel load: 310 kgs. Useful load: 540 kgs. Weight, loaded: 2,400 kgs. Maximum speed, sea level: 240 km.p.h. Speed at 5,000 m.: 220 km.p.h. Climb to 5,000 m.: 16 mins. Ceiling: 7,500 m. Safety factor: 12.

BERNARD (FERBOIS)

THE Bernard (Ferbois) Company, which is also designated at times by the initials S.I.M.B., exhibits at the *Salon* the Bernard 15 C.1 single-seater fighter with 500 h.p. Hispano-Suiza engine.

The Bernard 15 C.1 is a single-bay sesquiplane of timber construction, with a steel tube cabane and steel tube interplane struts of Y type. The bottom wing is placed aft with respect to the top wing, and thus affords the pilot excellent visibility. The wings are plywood-covered. The fuselage structure consists of two longitudinal main frames with stringers at top and bottom; the whole is plywood-covered.

The engine mounting consists of duralumin box girders and tubes; it is quickly detachable. The radiators are of the Lamblin eclipse type.

The armament consists of two synchronised and two wing guns, with 1,400 rounds of ammunition.

Specification.—Engine: 500 h.p. Hispano-Suiza. Span: 11·40 m. Length: 7·50 m. Height: 3·10 m. Wing area: 24·5 sq. m. Weight, loaded: 1,800 kg. Maximum speed, sea level: 260 kms.p.h. Speed at 5,000 m. altitude: 250 kms.p.h. Ceiling: 9,000 m.

MARCEL BESSON

Marcel Besson & Cie, of Boulogne-sur-Seine, who have produced during the past few years marine aircraft of the largest and of the smallest size, exhibit a Besson M.B.35 Submarine Scout (120 h.p. Salmson engine) and a Besson three-engined sea-monoplane fitted with 420 h.p. Gnôme-Rhône Jupiter engines.

The Besson MB..35 Submarine Scout is a low-wing, twin-float monoplane of conventional construction. The framing of the wings and of the fuselage is of timber, wire-braced, and fabric-covered; the undercarriage struts are steel tubes. This machine has been built with a special view to its being capable of quick dismantling and stowing away in small holds, such as are found on board cruiser submarines. With the wings removed, the machine fits into a packing case 7 m. by 4 m. by 4 m. which allows sufficient room for a mechanic to work on the engine. The wings may be dismantled in 10 mins.

Specification.—Engine, 120 h.p. Salmson (air cooled); span, 9·85 m.; length, 7·00 m.; height, 2·40 m.; wing area, 16·5 sq. m.; weight empty, 540 kg.; weight loaded, 765 kg.; Max. speed, sea level, 163 km.p.h.; climb, 2,000 m., in 12 min.; ceiling 4,200 m.

BLÉRIOT-AÉRONAUTIQUE

THE exhibit of Blériot-Aéronautique consists of (*a*) the Spad-61 altitude record type aeroplane, with 450 h.p. Lorraine-Dietrich engine, on which M. Callizo established the existing world's record with 12,442 m. on August 23, 1926; (*b*) the fuselage of a Blériot-165 transport aeroplane; (*c*) a Blériot variable pitch propeller; and (*d*) a Blériot elastic wheel.

The Spad-61 Altitude Record Aeroplane.—The Spad-61

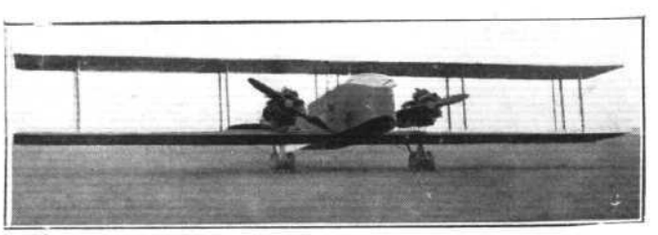
A WORLD'S RECORD HOLDER: The Spad 61 holds the world's record for altitude.

altitude record aeroplane is constructionally identical with the well-known Spad-61 single-seater fighter, 350 of which type were recently delivered to the Polish Air Force. The wings have duralumin spars and interplane struts, and wooden ribs, the framing being covered with fabric. The fuselage is of monocoque construction. The wings have 7 sq. m. more wing area than the single-seater-fighter, but the weight loaded is the same in both types (1,522 kg.).

The 450 h.p. Lorraine-Dietrich engine is equipped with a Rateau super-charger of the turbine type.

Specification of the Spad-61 Altitude Record Aeroplane.—Engine, 450 h.p. Lorraine-Dietrich; span, 11·72 m.; length, 7·185 m.; height, 3·20 m.; wing area, 37 sq. m.; weight, empty, 1,147 kg.; fuel load, 285 kg.; useful load, 90 kg.; weight loaded, 1,522 kg.; maximum speed, sea level, 283 km.p.h.

The Blériot 165 Transport Aeroplane.—The Blériot 165 transport aeroplane, which is now undergoing tests at Villacoublay, is a twin-engined adaptation of the Blériot 155 four-engined transport machine. It is understood that the Blériot 165, which is fitted with two 420 h.p. Gnôme-Rhône Jupiter engines, will be placed on the Paris-London service



The Bleriot 165 is a commercial aeroplane fitted with two "Jupiter" engines.

by the Air Union and that the four-engined machines of this type which were on order for this company will be transformed into twin-engined types.

The Blériot 165 is timber-framed throughout. The cabin, which accommodates 16 passengers, is very spacious and comfortable. A dual pilot's cockpit is fitted in the nose of the machine, and underneath this cockpit there is a luggage hold of 3 cub. m. capacity.

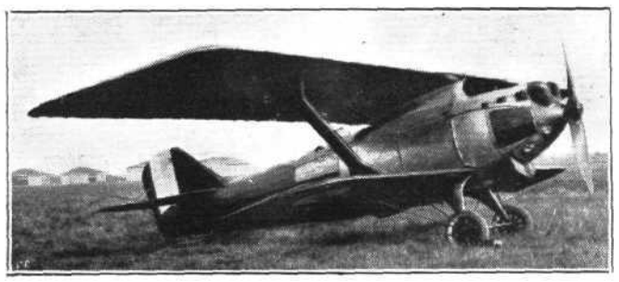
Specification of the Blériot 165 *Transport Aeroplane.*—Engines, two 420 h.p. Gnôme-Rhône Jupiter; span, 23·00 m.; length, 15·00 m.; height, 4·50 m.; wing area, 119 sq. m.; weight, empty, 3,100 kg.; fuel load, 750 kg.; useful load, 1,600 kg.; weight, loaded, 5,450 kg.; maximum speed, sea level, 180 km.p.h.

BREGUET

THE Louis Bréguet firm's exhibit at the *Salon de l'Aéronautique* will consist of three machines: (1) a Bréguet 19 G.R. (500 h.p. Hispano-Suiza), holder of the world's straight-line distance record; (2) a Bréguet 19 H. distant reconnaissance and bombing seaplane (450 h.p. Lorraine-Dietrich); and (3) a Bréguet 26 T six-passenger transport aeroplane (420 h.p. Ghôme-Rhône Jupiter).

The Breguet 19 *G.R. Distance Record Aeroplane.*—This is the type of machine on which the world's straight-away distance record was thrice broken between July 15 and November 1 of this year; first, from Paris to Omsk (Siberia), 4,715 km. in 27 hrs., by Captain Girier and Lieut. Dordilly; second, from Paris to Bunder Abbas (Persia), 5,200 km. in 27 hrs., by Lieut. Challe and Captain Weiser; and third, from Paris to Djask (Persia), 5,400 km. in 32 hrs., by Lieut. Costes and Captain Rignot.

The particular machine shown at the *Salon* is the one which made the Paris-Omsk and Paris-Djask flights, as well



THE BREGUET XIX, with 500 h.p. Hispano engine. This is the type which made the Paris-Omsk and Paris-Djask non-stop flights.

as the record attempt of Costes and Lieut. de Vitrolles from Paris to Assouan (Egypt). It has up to now covered a total distance of more than 40,000 km. (the length of the Equator) without having undergone any repair or change of engine, a 500 h.p. Hispano-Suiza.

The Bréguet 19 G.R. differs only in minor particulars from the well-known type 19 A.2 corps observation and 19 B.2 day bombing aeroplanes, of which approximately 1,300 have so far been furnished to the French Military Air Service and several hundred to the Air Forces of Poland, Yugoslavia, Spain and Japan. The framing of the type 19 is entirely of duralumin, pin-jointed and wire braced tubes being used in the fuselage, and built-up, riveted strips in the wing structure. The forward portion of the fuselage is covered with sheet aluminium, while the rear portion, the wings and the tail are fabric-covered.

The type 19 G.R. differs from the military type by having a slightly increased wing area (52·75 sq. m. as against 50 sq. m.), which is obtained by filling in the cut-out of the top wing; fuel tanks of much greater capacity (3,100 litres of petrol and benzol and 200 litres of oil), as a result of which the two cockpits have been removed further aft; and slightly increased tail surfaces. There is one big petrol tank (2,250 litres) just behind the engine; two additional petrol tanks on the sides of the fuselage, and two oil tanks of 100 litres capacity each on either side of the engine.

Equipped for the Paris–Djask flight, the Bréguet 19 G.R. had the following weight schedule:—

Weight equipped	1,518 kg.
Weight of crew, food and baggage ..	250 kg.
Weight of fuel (3,100 litres of petrol and benzol)	2,209 kg.
Weight of oil (200 litres)	180 kg.
Weight, loaded	4,157 kg.

The maximum range of the machine, in still air, was approximately 6,200 km.

The Bréguet 19 *H Reconnaissance Seaplane*

The Bréguet 19 H Reconnaissance Seaplane, which may be fitted with any power plant of 400–500 h.p., is the sea-going edition of the type 19 A 2. The machine is equipped with twin floats of sheet duralumin. These floats are 8 m. long, with a maximum diameter of 0·80 m., and have a capacity of 2,600 litres each.

Specification of the Bréguet 19 *H Seaplane.*—Engine, 420 h.p. Gnôme-Rhône Jupiter or 450 h.p. Lorraine-Dietrich; span (top), 14·83 m.; span (bottom), 11 m.; length, 11·52 m.; height, 4 m.; wing area, 50 sq. m.; weight, empty (Jupiter engine), 1,235 kg. (Lorraine engine), 1,350 kg.; fuel load (435 litres petrol and 50 litres oil), 350 kg.; useful load, 750 kg.; weight loaded (Jupiter engine), 2,335 kg. (Lorraine engine), 2,450 kg.

Maximum speed, sea level, 200 km.p.h.; climbing time, 1,000 m. in 4 mins. 40 secs.; 2,000 m. in 10 mins. 35 secs.; 3,000 m. in 18 mins. 25 secs.; 4,000 m. in 30 mins. Ceiling, 5,600 m.

The Bréguet 26 *T Transport Aeroplane.*—The Bréguet 26 T Transport Aeroplane is the first adaptation of the type 19 to the requirements of civil aviation. No changes have been made in the constructional methods, save that the central portion of the fuselage, which encloses the passenger cabin, is covered with plywood and that the top wing, instead of being mounted on a stream-lined cabane, is fixed flush with the roof of the cabin.

Although the 26 T retains unmistakable Bréguet lines, the noteworthy depth and width of the fuselage somewhat detract from the beautiful streamlines of the type 19. But this is only natural, considering the large cubic capacity modern transport aeroplanes require for efficient operation.

The machine may be provided with two standard engine mountings: one for the 420 h.p. Jupiter air-cooled radial,

THE BREGUET XXVI T, with "Jupiter" engine is an all-metal commercial aeroplane.

and the other for the 450 h.p. Lorraine-Dietrich, or for the 450 h.p. Hispano-Suiza. Two long exhaust pipes lead the gases behind the cabin, thus greatly reducing the noise in flight.

The cabin seats six passengers, but there is room enough for fitting a seventh seat, if required. There are two luggage holds, one just behind the cabin and the other underneath the pilot's cockpit, which is situated in front of the wings, where the pilot enjoys maximum range of vision in all directions.

As this machine is still undergoing official tests, no performance figures are available. The wing area is 55 sq. m., the weight, loaded (with 420 h.p. Jupiter engine), 2,825 kg., and the estimated maximum speed 204 km.p.h.

This machine is incidentally considered as a transition type which will be replaced by type 28 T. This last-named aeroplane will have a span of 17 m. and a wing area of 57 sq. m., and will carry eight passengers instead of six.

The following official performances are given for the Bréguet 28 T transport aeroplane (420 h.p. Jupiter):—

Maximum speed, sea level, 198 km.p.h.; climbing time, 2,000 m. in 15 mins., 3,000 m. in 28 mins.; ceiling, 4,500 m.; unstick run, 220 m.; range in still air, 800 km.

These performances were obtained with the following weight schedule:—

Weight, empty, 1,400 kg.; equipment (instruments, W/T, seats, &c.), 104 kg.; crew (1), 85 kg.; petrol (500 litres), 360 kg.; oil (60 litres), 56 kg.; pay load (passengers and goods), 1,000 kg.; weight, loaded, 3,005 kg.

C.A.M.S.

THE exhibit of the C.A.M.S. firm (*Chantiers Aéro-Maritimes de la Seine*) of Paris and Saint-Denis will be found this year on the stand of the Ministry of Marine in the shape of a type C.A.M.S. 37A three-seater fleet spotting amphibian.

This machine is a single-bay biplane pusher flying-boat, fitted with a 450 h.p. Lorraine-Dietrich engine. The crew of three are disposed as follows: a gunner-radio operator in a cockpit in the bows, the pilot forward of the lower

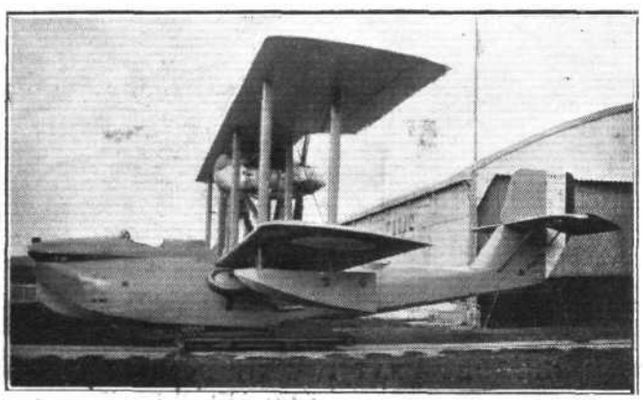
wings, and a second gunner aft of the wings in a cockpit which is fitted with dual controls. The C.A.M.S. 37A is a seaplane of conventional design, with timber-framed hull and wings. The hull has a single step and a Vee bottom, and is divided into a number of water-tight compartments. The longerons and the framing of the bulkheads (formers) are of ash; the secondary members are of spruce. The step is of ash, and is reinforced by galvanised sheet steel. The bottom of the hull is of triple planking, one layer of plywood and two layers of teak, while the sides of the hull have double planking. The vertical fin is built integral with the hull, and is covered with plywood. The hull is reinforced in the region of the propeller.

The amphibian gear, when not in use, folds up sideways against the wings. The shock-absorbing system comprises a number of rubber discs in compression.

The wings fold back against the hull for rapid stowage on board ships. The wing spars are of the box type, made of spruce and with veneer reinforcement webs. The wings are covered with fabric.

The 450 h.p. Lorraine-Dietrich engine is enclosed in a well streamlined cowling and actuates either direct-drive or a geared-down pusher airscrew.

The entire machine is quite noteworthy for its excellent streamlining and low parasitic resistance. A special mention should be made of the peculiarly-shaped "balcony" of the observers (forward) cockpit, which is reminiscent of the Zeppelin control car, and seems to be the rage in present-day French naval aircraft design.



THE C.A.M.S. 37 A. is an Amphibian, with 450 h.p. Lorraine-Dietrich engine. It is used as a fleet spotter.

Specification of the C.A.M.S. 37A Amphibian Flying-boat—Engine, 450 h.p. Lorraine-Dietrich; span, 14·50 m.; length, 11·43 m.; height, 4·04 m.; wing area, 58 sq. m.; weight, empty, 2,000 kg.; total useful load, 900 kg.; weight, loaded, 2,900 kg.; cruising range, 6 hrs.; max. speed, 170 km.p.h.; min. speed, 90 km.p.h.; climb, 3,000 m. in 35 mins.; ceiling, 4,000 m.; safety coefficient, 7·5.

(The above performances were obtained with the landing gear in lowered position.)

CAUDRON

THE *Société des Avions Caudron* exhibits at the *Salon de l'Aeronautique* a Caudron C.104 G.R. Two-Seater Distant-Reconnaissance Fighter fitted with the 420 h.p. Gnôme-Rhône Jupiter engine.

The Caudron C.104 G.R. is a strut-and wire braced sesquiplane of the type of timber construction characteristic and sufficiently well-known to readers of FLIGHT to dispense with more than a bare mention. The wings, the fuselage and the tail surfaces are fabric-covered.

The machine is equipped in accordance with the requirements of the French Military Air Service for this type of aircraft, namely, two fixed, synchronised guns, two flexible guss on a ring mount, a trap-door gun firing under the tail, an internal rack for twelve 10-kg. bombs, W/T, electrical heating and lighting installation, signal flares, oxygen inhalators and parachutes. Each machine gun is supplied with 500 rounds of ammunition.

Specification.—Engine, 420 h.p. Gnôme-Rhône Jupiter; Span, 14·56 m.; length, 9·50 m.; height, 3·27 m.; wing area, 44 sq. m.; weight equipped, 1,377 kg. (equipment, 227 kg.; armament, 116·5 kg.); weight of fuel, 270 kg.; weight of crew, 160 kg.; disposable load (ammunition, camera or W/T), 158 kg.; weight loaded, 1,965 kg.; max.

The Caudron C.104 G.R. long-distance reconnaissance two-seater with "Jupiter" engine.

speed, 209 km.p.h. at 1,000 m.; 207·5 km.p.h. at 2,000 m.; 204·5 km.p.h. at 3,000 m.; 198 km.p.h. at 4,000 m.; 186 km.p.h. at 5,000 m.; 158 km.p.h. at 6,000 m.; climb; 1,000 m. in 3 mins. 18 secs.; 2,000 m. in 7 mins. 27 secs.; 3,000 m. in 12 mins. 44 secs.; 4,000 m. in 19 mins. 44 secs.; 5,000 m. in 28 mins. 50 secs.; 6,000 m. in 59 mins. 39 secs.; service ceiling, 6,375 m.

The following alternate engine equipment may be fitted to the Caudron G.R. machines: type C.101-450 h.p. Hispano-Suiza; type C.103-450 h.p. Lorraine-Dietrich; type C.107-500 h.p. Salmson.

DESCAMPS

THE exhibit of the *Société des Avions Descamps*, of Sevres (Seine-et-Oise), consists of a Descamps A.2 two-seater reconnaissance-fighter, with 450 h.p. Lorraine-Dietrich engine.

The Descamps A.2 is a sesquiplane entirely built of duralumin, including the covering of the wings and of the fuselage. The top wing is trussed to the bottom wing by a species of Warren truss, consisting of streamlined N-struts. The undercarriage has streamlined mudguards.

The armament consists of two synchronised guns and of two flexible guns on a ring-mount.

Specification.—Engine, 450 h.p. Lorraine-Dietrich engine span, 14·50 m.; length, 9·35 m.; height, 3·35 m.; total wing area, 44 sq. m.; weight empty, 1,250 kg.; weight loaded, 2,000 kg.

As, at the time of writing, this machine was still undergoing performance tests before the S.T.Aé, no performance figures are available. The following performances were obtained with a machine of the same type fitted with a 400 h.p. Lorraine-Dietrich engine:

Max. speed: 203 km.p.h., at sea level; 202 km.p.h. at 2,500 m. alt.; 185 km.p.h. at 4,000 m.; 177 km.p.h. at 6,000 m. (ceiling).

Climb: 1,000 m. in 3 mins. 11 secs.; 2,000 m. in 7 mins. 47 secs; 3000 m. in 13 mins.; 4,000 m. in 21 mins. 24 secs.; 5,000 m. in 36 mins.

DYLE ET BACALAN

THE *Société Anonyme de Travaux Dyle et Bacalan*, a newcomer in the field of French aircraft construction, will show at the *Salon de l'Aviation* the central portion of the latest Dyle and Bacalan Night Bomber, type D.B. 10, which is fitted with two 420 h.p. Gnôme-Rhône Jupiter engines.

The D.B. 10 is a strut-braced, twin-tractor monoplane with a central fuselage of unusual lines. The forward portion of the fuselage carries on either side an excrescence shaped like an aerofoil, which contains the power plant, the fuel tanks, vertical bomb racks and, as a rule, all items of parasitic resistance which it is deemed desirable to hide from the air

The Dyle and Bacalan D.B.10 night-bomber with two "Jupiter" engines.

stream. As these excrescences have as great a maximum depth as the fuselage, the machine possesses an unusually big cubic capacity.

The D.B. 10 is of composite metal construction, that is, steel tubing is used for the wing spars and the wing struts, duralumin tubing for the longerons and cross members, and built-up duralumin strips for the wing ribs. The wings and the tail unit are fabric covered, and so is the fuselage, except around the engines where sheet aluminium is used.

The engine mounting is interchangeable with one taking the 450 h.p. Lorraine-Dietrich, or any other stationary engine of similar horse-power.

Specification of the Dyle et Bacalan D.B. 10.—Engines, two 420 h.p. Gnôme-Rhône Jupiter; span, 25 m.; length, 13·60 m.; total wing area, 93 sq. m.; weight, empty, 3,150 kg.; weight, loaded, 5,600 kg.; max. speed, sea level, 195 km.p.h.; ceiling, 6,000 m.

H. & M. FARMAN

THE *Société des Avions H. & M. Farman* exhibits the following machines:—(*a*) a Farman F.170 eight-passenger transport aeroplane, with 500 h.p. Farman engine; (*b*) a Farman F.160 night bombing aeroplane, with two 500 h.p. Farman engines; (*c*) a 500 h.p. Farman engine, type 12 W.E.

The Farman F.170 Transport Aeroplane.—The Farman F.170 Transport Aeroplane, which, owing to the lower curvature of its fuselage has been nick-named the *Ventre-à-terre*, is the latest machine of its class produced by the Farman Co. Its production has been the result of extensive experience gained by the constructors on the Paris-Amsterdam line, both with the Goliath and the four-engined Jabiru types. The excellent showing made by the *Ventre-à-terre* on the Paris-Cologne-Berlin service, where it has been in continuous use since last May, and in competition with highly-efficient types of German machines, indicates that the French Commercial Aviation has in the F.170 a machine of unusual merit.

While the Farman Company have, in the construction of this machine, remained faithful to their time-tried practice

The Farman F.170 with 500 h.p. Farman engine is an eight-passenger commercial aeroplane.

of using timber in preference to metal wherever a doubt may remain as to the superiority of one or the other—chiefly for reasons of ease of repair and low-production cost—the F.170 may be said to embody all the latest safety features which aerial passengers are entitled to find on modern transport aeroplanes. To begin with, the engine, the 500 h.p. "broad-arrow" Farman 12 W.E., has a record of endurance and reliability unsurpassed, for it holds both the world's endurance records for 1924 and 1925, with 38 and 45 hours, respectively, and it also powered Lieut. Challe and Captain Weiser's Bréguet 19 G.R. in their Paris-Bunder Abbas flight, when they broke the world's distance record by flying 5,200 km. non-stop, in 27 hrs.

In the second place, the 1 : 2 reduction gear of the Farman engine enables the pilot to fly the machine throttled down with great efficiency, which will be evident from the fact that at a cruising speed of 150 km.p.h. the engine only develops 300 h.p., thus giving a "pay-loading" of approximately 3 kg./h.p.

Special safeguards against fire hazard are incorporated in this machine. Chief of these is the position of the petrol tanks in the wings, well removed from the engine compartment to give added safety to the system already embodying a fire-proof bulkhead, instantaneous blocking devices in the petrol lines and fire extinguishers.

Structurally, the chief characteristic of the F.170 is the great simplicity and straightforwardness of the design. All stress-bearing elements are of liberal size, great simplicity and evident sturdiness, the machine being obviously designed for hard usage. The framing of the wings and of the fuselage are of timber, with sheet steel fittings and wire bracing. The wings are fabric-covered, and so is the fuselage, except around the engine, where sheet aluminium is used, and the doors of the cabin and the freight hold, which are reinforced plywood panels. The engine cowling is hinged so that the engine becomes quickly accessible. The wing bracing and under-carriage struts are faired steel tubes. The wings are fixed to the fuselage by four bolts.

Considerable attention has also been paid to the comfort of the passengers. The cabin is fitted with eight very comfortable chairs and is equipped with electric lights and water radiators. Large windows coupled with the high wing give a good view of the ground. The noise of the power plant is practically abolished by a long exhaust pipe which ends aft of the cabin. Luggage and other freight is carried in two holds with separate entrances, one of these being aft of the cabin, and the other underneath the pilot's cockpit. The latter is situated flush with the leading edge of the wings and affords excellent visibility.

Specification.—Engine, 500 h.p. Farman; span, 16·10 m.; length, 11·76 m.; height, 3·20 m.; total wing area, 52·50 sq. m.; weight, equipped, 2,018 kg.; weight of fuel, 370 kg.; weight of crew (1), 80 kg.; pay load, 850 kg.; weight, loaded, 3,318 kg.; max. speed, 202 km.p.h. at sea level, 197 km.p.h. at 1,000 m., 191 km.p.h. at 2,000 m., 183 km.p.h. at 3,000 m.; speed at 9/10th power output, 190 km.p.h.; commercial speed (3/5th power output), 150 km.p.h.; cruising range in still air, 750 km.; climb, 1,000 m. in 2 mins. 52 secs. 2,000 m. in 14 mins. 25 secs., 3,000 m. in 27 mins. 21 secs., 4,000 m. in 58 mins. 45 secs.; service ceiling, 4,300 m.

The Farman F.160 Night Bomber.—The Farman F.160 Night Bomber is essentially the latest revised edition, with two 500 h.p. Farman engines in place of the Salmsons or Lorraines, of the well-known F.60 type or Goliath *militaire*, which exists in quantities in the French and the Polish Military Air Services. The naval torpedo-dropping version of the Goliath, fitted with two 420 h.p. Gnôme-Rhône "Jupiters," is known as the F.150.

The extensive experience obtained with all these earlier types has been incorporated in the F.160, which is, like its forerunners, an equal-winged, two-bay, twin-tractor biplane. The machine is timber-framed throughout, with steel fittings and wire bracing. The wings, the tail surfaces and the greater part of the fuselage are fabric-covered; the habitable portion of the fuselage, containing the navigation and bombing room, forward, the pilots' cockpit, and the after gunner's post, are covered with plywood.

The nose of the fuselage is built in the shape of a balcony which gives maximum visibility for observation and bombing work. The observation room contains a complete set of navigation instruments, with chart cabinet and folding table, and the bomb sights and bomb-release controls. The medium-size bombs are carried in vertical racks inside the fuselage, aft of the pilot's cockpit. Fittings for carrying additional medium-sized bombs of up to 200 kgs. and two big bombs of over 400 kgs., are provided for on the lower wings. The normal military load includes a crew of four (pilot, navigator-bomber, mechanic, gunner), five machine guns (two each on gun rings fore and aft, and one aft, firing through the floor), with the necessary ammunition, 1,200 kgs. of bombs, and fuel for a 1,000-km. flight. While this is the normal load of the machine, both the fuel tanks and the bomb racks permit of carrying an additional load of approximately 1,000 kgs., the maximum bomb load being then 2,750 kgs. and the maximum fuel load 1,700 kgs. A W/T room, with sending and receiving apparatus, is fitted aft of the vertical bomb racks and forward of the rear gun-post. Normally, the mechanic, for whose use a folding seat is provided alongside the pilot's seat, is the W/T operator.

The F.160 is equipped with a complete electrical installation for starting, lighting, heating and W/T purposes. The generators, which provide the electrical energy for the W/T and for lighting, are driven from the engines, but they can also be actuated by the starting batteries. The latter provide for about 200 starts.

Specification.—Engines, two 500 h.p. Farman; span, 26·75 m.; length, 14·90 m.; height, 5·30 m.; total wing area, 200 sq. m.; weight, empty, 4,000 kgs.; normal useful load, 3,000 kgs.; weight (normally) loaded, 7,000 kgs.; max. speed, sea level, 186 km.p.h.; speed at 3,000 m. altitude, 178 km.p.h.; climb to 2,000 m., 11 mins., 4,000 m. 30 mins. theoretical; ceiling, 6,000 m.

The Farman F.160 can also be fitted as a torpedo-dropper, in which case twin-floats take the place of the land under-carriage. The additional weight of the floats is allowed for in the excess load mentioned above.

Equipped as a seaplane, the F.160 carries the same normal useful load of 3,000 kgs. as the land-going model, but the performance is naturally lowered as follows: Max. speed, sea level, 180 km.p.h.; climb, 2,000 m. in 35 mins; theoretical ceiling, 4,500 m.

FOKKER

THE famous Dutch aircraft constructor, whose firm is the *N. V. Nederlandsche Vliegtuigenfabriek* of Amsterdam, will be represented by two aeroplanes, one a commercial type and one a military. The former is the three-engined monoplane type F.VII–3m., similar to that on which Commander Byrd flew to the North Pole, and the latter is the C.V. two-seater fighter.

The Fokker F.VII–3m. monoplane is fitted with three Armstrong-Siddeley "Lynx" engines of 185 h.p. each, and is of the familiar form of Fokker construction with welded steel tube fuselage and all-wood wing. The pilot's cockpit has accommodation for two pilots, and dual controls are provided. The cockpit is equipped with night-landing equipment, and there is ample room for wireless apparatus. A door

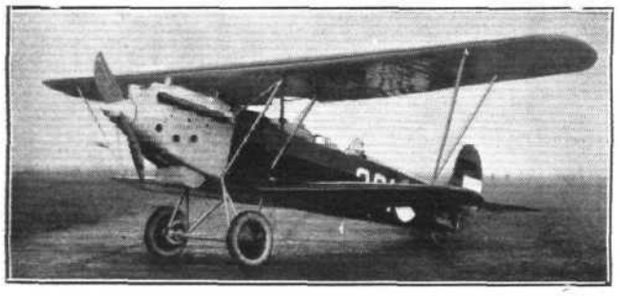
THE FOKKER F. VII. 3m is a commercial monoplane. The three engines fitted are Armstrong-Siddeley "Lynx" of 180 h.p. each.

in the rear wall of the cockpit gives access to the passengers' cabin, which has seating accommodation for 8 passengers. In addition to heating and ventilating arrangements there is a lavatory at the rear end of the cabin, and behind that again, with a separate door in the side of the fuselage, is a large luggage and goods compartment, a smaller luggage space being provided under the pilots' cockpit.

The Fokker F.VII–3m. can also be used as an ambulance machine, when it gives accommodation for 6 stretchers and one attendant. Furthermore, it can be supplied as a night-bomber, when the armament consists of 1 or 2 machine guns, one of which is fitted over an opening in the roof at the rear of the cabin. As bomb load may be carried 10 bombs of 50 kg. each, or 5 of 100 kg. or 2 of 250 kg. or 1 weighing 500 kilos. The crew consists then of one pilot, one assistant pilot or navigator, and one gunner.

Finally the Fokker F.VII–3m can be supplied as a torpedo carrier, when a torpedo weighing 1,000 kg. can be slung underneath the fuselage. In this case the crew consists of one pilot and one observer.

Specification of Fokker F.VII–3m.—In its commercial form the machine has the following characteristics: Span, 19·3 m.; length overall, 14·6 m.; wing area, 58·5 sq. m. (a larger wing having an area of 67 sq. m. can be supplied). Weight empty, 2,150 kg.; fuel and oil, 600 kg.; crew 150 kg.; 8 passengers and luggage, 700 kg.; total loaded weight, 3,600 kg. Wing loading, 61·5 kg./m²; power loading, 6·6 kg./h.p. Maximum speed, 185 km./h.; cruising speed, 165 km./h.; minimum speed, 80 km./h. The climb is as follows: 1,000 m. in 5·8 mins.; 2,000 m. in 12·3 mins.; 3,000 m. in 22·2 mins.; ceiling approximately 4,700 m. Duration approximately 5 hours. These performance figures are guaranteed to within a margin of 3 per cent. on speed and 6 per cent. on climb.



THE FOKKER C. V. can be supplied with a number of different engines, and can be quickly converted into a two-seater fighter, a reconnaissance machine, a bomber, or even a school machine.

The Fokker C.V.—The machine exhibited at the Paris Show will be fitted with a 450 h.p. Hispano-Suiza engine, but this machine can be fitted with almost any engine, a list issued by the Fokker firm including no less than 10 different types, while the use of different wings etc., affords further combinations possible, so that the C.V. can justly be described as a "general-purpose" aeroplane. Furthermore, it can, if desired, be supplied as a seaplane, so that there is practically no end to the variety of forms which the C.V. may take. The choice of wings for different purposes has been greatly facilitated by the cantilever wing arrangement, which calls for but a very few fittings.

As shown at Paris, the Fokker C.V. will have the "D" cellule, *i.e.*, wings giving a total area of 28·8 sq. m. Constructionally the machine follows normal practice in that it has the welded tube fuselage and the wooden wings with three-ply covering. The engine mounting, in order to allow of a rapid change-over to another type of engine, or of replacing a damaged engine, is a complete unit, attached to the fuselage by four bolts only.

Specification of Fokker C.V:—Wing span, 12·5 m.; length overall, 9·53 m.; wing area, 28·8 sq. m.; weight of machine empty, 1,290 kg.; load 600 kg.; total loaded weight, 1,890 kg. Top speed 255 km./h.; low speed 95 km./h.; climb to 1,000 m. in 2·1 mins.; to 2,000 m. in 4·6 mins.; to 3,000 m. in 7·6 mins.; to 4,000 m. in 11·5 mins.; to 5,000 m. in 17 mins. Ceiling, 6,700 m. With a load of 800 kg. the following performances are obtained; top speed, 252 km./h.; low speed, 100 km./h. Climb to 2,000 m. in 5·6 mins.; to 5,000 m. in 23 mins. Ceiling, 6,300 m.

HANRIOT

THE *Avions Hanriot* firm, particularly well known for its training aeroplanes, large numbers of which have been supplied to the French and numerous foreign governments, will exhibit three machines: (1) a type H.35 advanced training aeroplane with 180 h.p. Hispano-Suiza engine; (2) a type H.41 training seaplane with 120 h.p. Salmson engine; and (3) a type H.14S ambulance aeroplane with 80 h.p. Rhône engine.

THE HANRIOT H. 35, with 180 h.p. Hispano engine, is an advanced training machine.

Hanriot H.35 Training Aeroplane

This machine is a strut-braced parasol monoplane which bears a certain resemblance with the Morane-Saulnier training aeroplanes, though, as a matter of fact, the two machines differ considerably in engineering practice.

The H.35 has a composite structure—that is, the wings have duralumin tube spars and lattice work compression members with wooden ribs, the whole being covered with fabric, while the fuselage is built up on four duralumin tube longerons and cross pieces, with wooden fairing members. The fuselage is also covered with fabric, except in the neighbourhood of the engine, where the covering is sheet aluminium. The cabane struts and the lateral bracing struts are faired duralumin tubes, wire-braced.

The landing gear is of the Vee type with a divided, rubber-sprung axle. All the landing gear struts are duralumin tubes.

The ailerons are controlled by means of push-and-pull rods. Dual control is provided; the front control may be declutched from the pilot's seat (at rear), or may be entirely removed if the machine is not to be used for instruction purposes.

The petrol tank is of the gravity type, and is mounted in the centre section. The oil tank is mounted in the engine compartment, and acts at the same time as oil radiator. Fuel for three hours' flight is carried.

Specification of the Hanriot H.35

Engine, 180 h.p. Hispano-Suiza; span, 11·40 m.; length, 7·47 m.; height, 2·75 m.; wing area, 22 sq. m.; weight empty, 600 kg.; useful load, 200 kg.; fuel load, 150 kg.; weight loaded, 950 kg.; maximum speed, 207 km.p.h.; ceiling, 6,500 m.

Hanriot H.41 Training Seaplane

The Hanriot H.41 (120 h.p. Salmson) training seaplane is an adaptation to the requirements of naval training of the well-known Hanriot H.D.14 training landplane on which Lieut. Thoret made his famous powerless flights of several hours' duration. The H.41 is a twin-float biplane of orthodox timber construction, wire-braced and fabric covered. The floats are built of crossed planking, and are secured to the fuselage by steel tubes.

Specification of the Hanriot H.41

Span, 10·26 m.; length, 8 m.; wing area, 34·9 sq. m.; weight empty, 725 kg.; weight loaded, 1,000 kg.; maximum speed, 120 km.p.h.; minimum speed, 52 km.p.h.

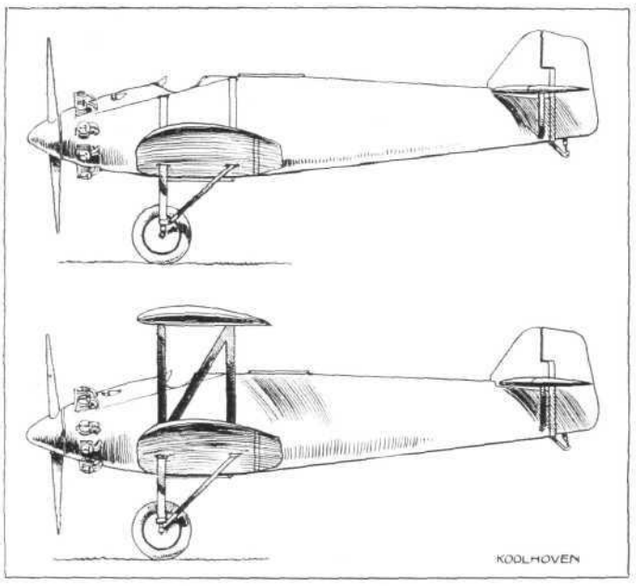
Hanriot H.14S Ambulance Aeroplane

The Hanriot H.14S ambulance aeroplane, which was extensively used during the recent campaign in Morocco, where it rendered great services, is again an adaptation of the H.D. 14 training aeroplane.

The H.14 is fitted with a longitudinal compartment which accommodates one stretcher case. A folding seat is also provided in case it is desired to carry the wounded in a seated position.

KOOLHOVEN

MR. FREDERICK KOOLHOVEN, who will be familiar to most of our readers from his work in England before, during and after the war, is exhibiting a very interesting little machine at the Paris Show. The most unusual feature of the machine, which is to be known as the type F.K. 35, is that it can be converted from monoplane into biplane and vice versa. Normally the machine is intended to be a low-wing monoplane, two-seater



THE KOOLHOVEN F.K. 35 is a "Jupiter"-engined two-seater fighter, which can be converted from monoplane to biplane and vice versa.

fighter, but for use by the air forces of smaller nations who wish to make a special study of economy, the machine can be turned into a biplane and used for reconnaissance. The fuselage is of all-metal (tubular) construction, while the wing is of wood and covered with ply-wood. The engine fitted is a Bristol Mark VI "Jupiter."

The *F.K. 35*, in addition to its dual form, has several remarkable features in its design, Mr. Koolhoven having ever been strong on originality. Thus, the petrol tanks, which are housed in the wings, are so suspended inside the wings that they can be dropped in case of trouble by the pulling of a lever in the pilot's cockpit. The under-carriage has a very wide track, so that there should be small risk of the machine turning over on the ground. Shock absorption is by an oleo cylinder, a type of undercarriage used by Koolhoven since about 1915.

Another interesting feature of the F.K. 35 is the mechanically operated gun-turret, which enables the gun to be used at high aeroplane speeds. Details of this cannot be given at the moment, but we hope to refer to it in detail in a later article. The armament, incidentally, consists of four guns—two Vickers and two Lewis guns. In addition, there is room in the fuselage for camera or wireless set. Ailerons are fitted to the lower plane only, and run the whole length of the span.

Specification.—Wing span, 10·5 m.; length overall, 8·6 m.; weight of machine empty, 896 kgs.; fuel, 386 kgs.; military load, 286 kgs.; total loaded weight, 1,568 kgs. Speed at 3,000 m., 260 km./hr. Climb to 5,000 m. in 14 mins. Landing speed, 88·5 km./hr.

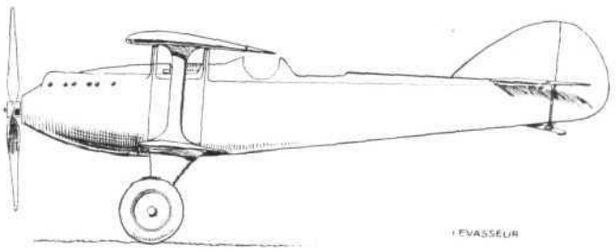
LEVASSEUR

THE firm of Pierre Levasseur, which is one of the largest contractors of aircraft to the French Navy, will exhibit at the *Salon* the following machines: (*a*) a three-seater shipboard reconnaissance aeroplane, with 450 h.p. Lorraine-Dietrich engine; (*b*) a two-seater fighter, with 500 h.p. Hispano-Suiza engine; (*c*) a transport aeroplane, with 420 h.p. Gnôme-Rhône Jupiter engine.

The P. Levasseur three-seater naval reconnaissance aeroplane has a detachable undercarriage and a water-tight fuselage.

In addition, there will be found on the Levasseur stand wooden and metal propellers of various types, including the Levasseur-Reed duralumin airscrew, for which this firm is sole licensee for France.

The Levasseur Shipboard Reconnaissance Aeroplane.—The Levasseur shipboard reconnaissance aeroplane belongs to the class of naval aircraft which are designated in France under the term *avion marin*, which does not mean, as some suppose, a seaplane, but rather a seagoing aeroplane. The *avions marins* of the French Navy are used both for shipboard and coastal service, in the carrying out of which work they may have to alight in an emergency on water. For this purpose the lower portion of the fuselage is built in the form of a sturdy water-tight hull, fitted with a step; when the pilot has to alight on water, he merely releases the undercarriage and locks the airscrew in horizontal position; the machine can then come to rest without any danger of nosing over, and will float indefinitely. Wing-tip floats contribute to the hydrodynamic stability of the machine.



The P. Levasseur VI C.2 two-seater fighter with 500 h.p. Hispano Engine.

The wings are timber framed and fabric covered, while the fuselage is mainly built of plywood over two longitudinal main frames, which are joined by a bottom and a top of plywood. This type of construction does away with all wire bracing, and insures absolute water-tightness. The engine mounting is built of steel tubing. The wings may be folded for stowage on board aircraft carriers.

Specification of the Levasseur Shipboard Reconnaissance Aeroplane.—Engine, 450 h.p. Lorraine-Dietrich; span, 14·60 m. (open), 5·67 m. (folded); length, 9·70 m.; height, 3·91 m.; wing area, 60 sq. m.; weight, empty, 1,550 kg.; fuel load, 310 kg.; useful load, 540 kg.; weight, loaded, 2,400 kg.; max. speed, sea level, 185 km.p.h.; speed at 3,000 m. altitude, 175 km.p.h.; climb to 3,000 m. altitude, 20 mins.; ceiling, 5,500 m.

The Levasseur VI C.2 Two-seater Fighter.—The Levasseur VI C.2 two-seater fighter is a landplane which answers the latest requirements of the French Military Air Service for this class of machines. The engine is a 500 h.p. Hispano-Suiza.

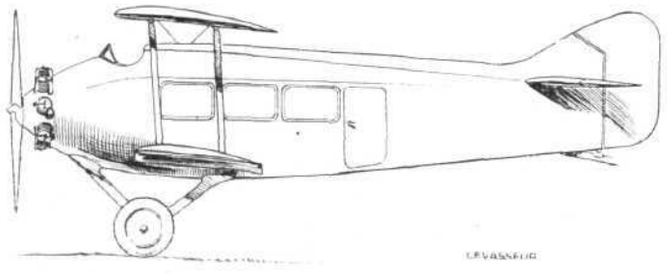
Constructionally the machine resembles the three-seater shipboard reconnaissance aeroplane of the firm, particularly in respect to the fuselage which is built up on two main longitudinal frames in such a way as to do away with all metal fittings and wire bracing. This type of fuselage possesses a remarkable resistance to atmospheric variations. The wings have metal spars, the remainder of the framing being of timber.

Dual control is fitted, and the petrol tank may be jettisoned by the pilot.

A noteworthy point of the undercarriage is that no shock absorbers are fitted to the wheels, their springing being entirely effected by the use of special tyres.

Specification of the Levasseur VI C.2 Two-seater Fighter.—Engine, 500 h.p. Hispano-Suiza ; span, 12·20 m. ; length, 8·75 m. ; height, 3·10 m. ; wing area, 40 sq. m. ; weight, empty, 1,200 kg. ; fuel load, 286 kg. ; useful load, 500 kg. ; weight, loaded, 1,986 kg. ; max. speed, sea level, 215 km.p.h.; ceiling, 7,500 m.

The Levasseur 7 T. Transport Aeroplane.—The Levasseur 7 T. Transport Aeroplane, with a 420 h.p. Gnôme-Rhône Jupiter engine, is a single-bay tractor biplane of simple but sturdy construction. The type of construction is similar to that employed on the two machines described above. The wings may be folded for stowage.



The P. Levasseur 7.T Limousine with "Jupiter" Engine.

The cabin is spacious, and accommodates six passengers in very comfortable seats. The pilot's cockpit is situated right behind the engine and ahead of the wings, thus giving the pilot a maximum of visual range. Behind the pilot's cockpit there is a navigation room which is equipped with wireless telephony.

Specification.—Engine, 420 h.p. Gnôme-Rhône Jupiter ; span, 14·50 m. (open), 5·67 (folded) ; length, 10 m. ; height, 3·85 m. ; wing area, 60 sq. m. ; weight, empty, 1,550 kg. ; fuel load, 300 kg. ; useful load, 850 kg. ; weight, loaded, 2,700 kg. ;. max. speed, sea level, 180 km.p.h.

LIORÉ ET OLIVIER

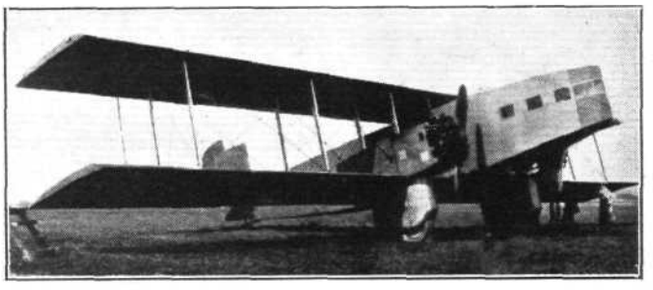
THE *Etablissements Lioré et Olivier* will probably be the only French firm to have a stand devoid of any military aeroplane, their exhibit consisting of a LeO 21 Transport Aeroplane (two 420 h.p. Gnôme-Rhône Jupiter engines) and a LeO H.190 Transport Seaplane (420 h.p. Gnôme-Rhône Jupiter engine). A scale model of the LeO H.15 Transport Seaplane fitted with three Jupiter engines, which took part in the recent commercial seaplane competition at Saint-Raphaël (Var), will also be shown.

The LeO 21 Transport Aeroplane.—The LeO 21 Transport Aeroplane, several of which will shortly be placed on the Paris-London service of the Air Union, is a twin tractor biplane of conventional construction, but of high performance. This machine differs only in its equipment from the LeO 20 three-seater night bomber, which was recently adopted by the French Military Air Service after a competition in which several constructors participated.

The framing of the LeO 21 is of duralumin. The cabin is particularly large and accommodates in a forward compartment six passengers, and in an after compartment twelve passengers. The pilot's cockpit, which is fitted with dual control and wireless telephony and telegraphy, is situated between the two passenger compartments. The freight holds have independent means of access.

Both the tail plane and the vertical fin incorporate an adjustable incidence gear, which may be controlled in flight from the pilot's cockpit, to allow for different trimmings.

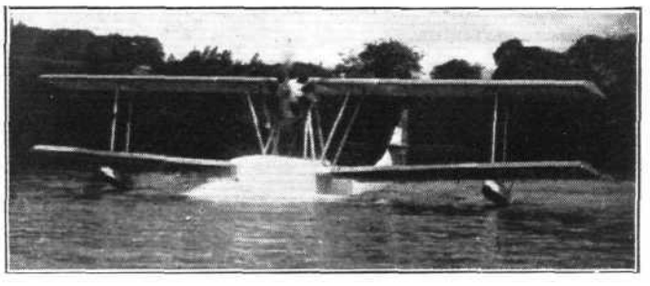
The engine mounting takes either the 420 h.p. Jupiter or the 480 h.p. Renault engines. The engines are started by a Jupiter servo-motor.



The Liore and Olivier LeO 21 commercial aeroplane with two "Jupiter" engines.

Specification.—Engines : two 420 h.p. Gnôme-Rhône Jupiter. Span : 22·76 m. Length : 15·40 m. Height : 4·30 m. Wing area : 106·5 sq. m. Weight, empty : 2,690 kg. Fuel load : 800 kg. Crew : 160 kg. Wireless set : 50 kg. Commercial load : 1,800 kg. Weight, loaded : 5,500 kg. Maximum speed, sea level : 192 km. per hour. Range in still air : 800 km.

The LeO H. 190 Transport Seaplane.—The LeO H. 190 Transport Seaplane is a single-bay tractor biplane flying boat fitted with a 420 h.p. Gnôme-Rhône Jupiter engine. The cabin, fitted forward, accommodates six passengers. Aft of the cabin there is the pilot's cockpit and a wireless room.



The Liore and Olivier LeO H.190 is a transport flying boat fitted with 420 h.p. "Jupiter" engine.

The hull and the wing framing is of timber, and the wings are fabric-covered.

It is on a machine of this type that *Lieutenant de vaisseau* Bernard and *Second maître* Garrat of the French Navy flew from Marseilles to Madagascar via the African waterways.

Specification.—Engine : 420 h.p. Gnôme-Rhône Jupiter. Span : 16·00 m. Length : 12·50 m. Height : 4·10 m. Wing area : 64·2 sq. m. Weight, empty : 1,700 kg. Fuel load : 480 kg. Useful load : 1,020 kg. Weight, loaded : 3,200 kg. Maximum speed, sea level : 170 km. per hour. Range in still air : 750 km.

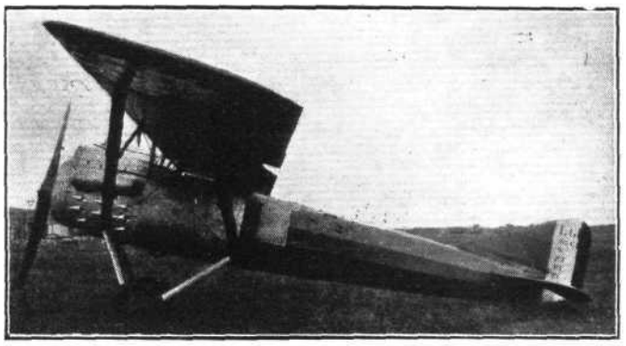
LOIRE-GOURDOU-LESEURRE

THE aeroplanes produced under the above firm name, which is as a rule abbreviated into "L.G.L.," result from an arrangement whereby the aeronautical design office of Messrs. Gourdou and Leseurre became, in 1925, the aircraft engineering department of the *Ateliers et Chantiers de la Loire*

THE L.G.L. 32 C.1, with Bristol "Jupiter" engine, is a single-seater fighter of the parasol monoplane type.

of Saint-Nazaire, one of the biggest shipbuilding firms of France.

The L.G.L. exhibit at the Salon will consist of two single-seater fighters, type 32 C.1 (420 h.p. Gnôme-Rhône Jupiter) and type 33 C.1 (450 h.p. Lorraine-Dietrich), and of an ambulance aeroplane, type 23 T.S. (180 h.p. Hispano-Suiza).



THE L.G.L. 33 C.1, with 450 h.p. Lorraine-Dietrich, is similar to the 32 C 1, except for the water-cooled engine.

Specification of the L.G.L. 32 *C.* 1 *and* 33 *C.* 1 *Single-Seater Fighters*

	32 C.1	33 C. 1
Type	32 C.1	33 C. 1
Engine	420 h.p. G-R Jupiter	450 h.p. Lorraine
Span	12·200 m.	12·20 m.
Length	7.55 m.	8·03 m.
Height	2·95 m.	2·95 m.
Wing area	25 sq. m.	25 sq. m.
Weight, empty	963 kg.	1,139 kg.
Petrol	252 kg.	226 kg.
Oil	33 kg.	18 kg.
Military load	280 kg.	165 kg.
Weight, loaded	1,370 kg.	1,548 kg.
Range	2 hrs. 30 m.	3 hrs.
Safety factor	12	11
	km.p.h.	km.p.h.
Max. speed, sea level	250	250
,, 3,000 m.	245	245
,, 5,000 m.	240	237
,, 6,000 m.	235	220
,, 7,000 m.	230	200
,, 8,000 m.	210	—
Ceiling	9,750 m.	8,500 m.
Climb to 2,000 m.	3 m. 5 s.	3 m. 5 s.
,, 5,000 m.	12 m.	15 m.
,, 7,000 m.	—	31 m.
,, 8,000 m.	31 m.	—
Landing speed	90 km.p.h.	90 km.p.h.
Landing run	150 m.	150 m.
Unstick run	80 m.	80 m.

THE L.G.L. 23 TS, with 180 h.p. Hispano engine, is an ambulance 'plane.

Except for their different power plant and the resulting difference in weights and performance, the two single-seater fighters are absolutely identical in construction and dimensions. The framing of these machines is a composite structure, metal being used for the stress-bearing members and wood for the secondary elements, such as ribs, fairing pieces, etc. The wings are built up on duralumin spars, with wooden ribs; the fuselage has a framing of welded steel tubes. Both the wings and the fuselage are covered with fabric.

These two machines were constructed to satisfy the latest requirements of the French Military Aviation Service, the importance attached to each point being in the order named: (1) armament; (2) ceiling and rate of climb; (3) horizontal speed, and (4) manœuvrability.

The armament of the L.G.L. single-seater fighters consists of two synchronised (Vickers or Darne) machine guns and of two Darne machine guns fixed on the wing and firing above the propeller. The mounting of the wing guns has been designed with particular care to protect the wing structure against vibrations from the guns when they are in action.

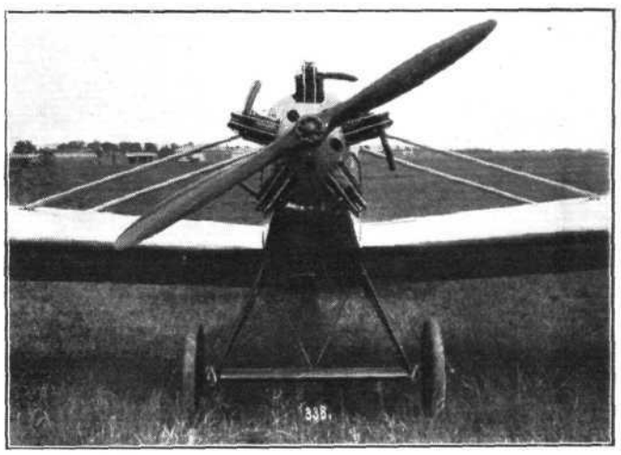
The L.G.L. type 23 T.S. ambulance aeroplane resembles in its essential points the single-seater fighters above mentioned. The cabin accommodates one service stretcher, and contains a complete first-aid equipment, including an oxygen inhalator. The cabin is electrically heated.

Specification of the L.G.L. 23 *T.S. Ambulance Aeroplane*

Engine, 180 h.p. Hispano-Suiza; span, 11·00 m.; length, 6·90 m.; height, 2·60 m.; wing area, 22·5 sq. m.; weight empty, 700 kg.; weight, loaded, 970 kg.; maximum speed, 180 km.p.h.; climb, 500 m. in 2 min. 20 secs.; 1,000 m. in 5 min.; 3,000 m. in 19 min. Range, 2½ hrs.

MILOS BONDY A SPOL

THIS well-known Czecholovak firm is exhibiting two aeroplanes, the little Avia B.H. 11 with Walter engine, and a two-seater fighter, the Avia B.H. 26.



THE AVIA B.H.11, with Walter engine, is the winner of a number of competitions, most recently that for the "Coppa d'Italia."

The Avia B.H.11 is already well known to our readers, and a detailed description is not, therefore, required. The machine is used extensively in the Czecho-Slovakian Army for training purposes. The engine is a 60 h.p. Walter radial air-cooled. Following are the main particulars and performances of the Avia B.H.11:—Wing span, 9·72 m.; length overall, 6·64 m.; wing area, 13·6 sq. m.; weight of machine empty, 352 kg.; useful load, 228 kg.; total loaded weight, 580 kg. Top speed, 160 km./hr.; low speed, 75 km./hr.; landing speed, 65 km./hr. Climb to 2,000 m. in 12 mins. Ceiling, 4,000 m.

The *Avia B.H.*26 two-seater fighter is fitted with a "Jupiter" engine and is a biplane of normal design, with a single bay in the wing cellule and "N" interplane struts. The top plane is, however, of slightly smaller span than the bottom. The wing construction is normal, with box spars and wood ribs. The covering is three-ply wood up to the rear spar, the whole afterwards fabric-covered. The ailerons are of welded steel-tube construction and are fitted to the lower plane only.

The fuselage is of the ply-wood covered box type, without internal bracing wires. The pilot's cockpit is in front, and is equipped with all the usual instruments, as well as with two fixed Vickers guns firing through the propeller, while the gunner has the usual gun ring for his two Lewis guns. Space is provided for 600 rounds of ammunition for the Vickers guns and 1,000 rounds for the Lewis guns. The main petrol tank is inside the fuselage, between the fireproof bulkhead and the pilot's cockpit.

THE AVIA B.H. 26 two-seater fighter has a " Jupiter " engine.

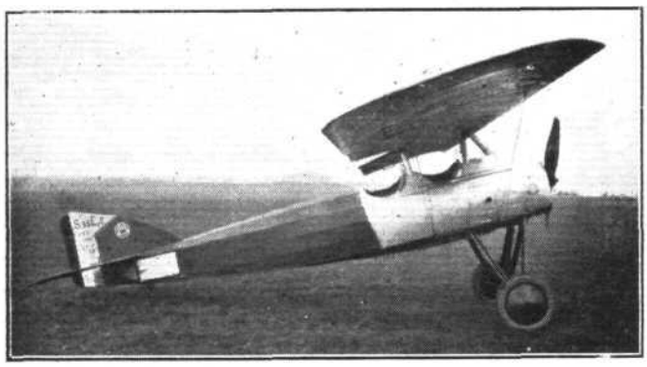
The undercarriage is of the Vee type, the rear legs being telescopic and fitted with rubber blocks working in compression.

Specification of Avia B.H.26.—Wing span bottom plane, 10·8 m.; top plane, 10·2 m.; length overall, 8·78 m.; wing area, 31·32 sq. m.; weight of machine empty, 1,060 kg.; fuel and oil, 220 kg.; crew and equipment, 420 kg.; total loaded weight, 1,700 kg.; duration, 2 hrs. Top speed, 240 km./hr.; stalling speed, 90 km./hr. Climb to 5,000 m. in 20 mins. Ceiling, 7,000 m.

MORANE SAULNIER.

THIS veteran firm of aircraft builders, which originated the parasol monoplane type—a type that enjoys today great popularity among French constructors, as will be seen from the exhibits of the *Salon*—will exhibit three machines.

The first of these is the Morane-Saulnier type 35 E.P.2 elementary training aeroplane, with 80 h.p. Le Rhône engine (the letters E.P. stand for *école primaire*); the second is a type 129 E.T.2 (180 h.p. Hispano-Suiza) advanced training aeroplane (the letters E.T. meaning *école de transition*); the third machine is the type 132, with 120 h.p. Salmson air-cooled engine, which is mainly intended for touring purposes, but may also be used for training work.



THE MORANE-SAULNIER E.P.2, with 80 h.p. le Rhone, is an elementary training machine.

The 35 E.P.2 elementary training machine, of which large numbers exist in the French and foreign military air services, is too well known to require more than a brief mention. The framing of the wings is of timber, except for the spars, which are duralumin tubes. The fuselage has wooden longerons and plywood formers. Both the wings and the fuselage are fabric-covered. The undercarriage struts are steel tubes.

Special care has been taken to make the controls highly responsive and so enable the instructor to impart to his pupil good flying manners; with this end in view the pivoted portions of the controls are mounted on ball bearings, thus insuring great smoothness of action. The tail skid is steerable.

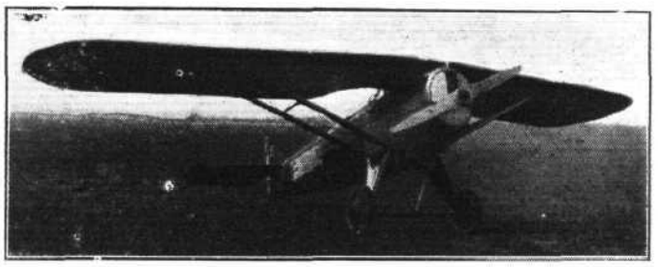
The normal equipment includes a fire extinguisher and parachutes for the two occupants.

Morane-Saulnier Type 129 *E.T.2 Aeroplane*

The Morane-Saulnier type 129 E.T.2 advanced training aeroplane is a strut-braced parasol monoplane which incorporates a particularly complete system of safety features, among which may be mentioned a droppable petrol tank, fire extinguishers, back or seat type parachutes and a self-starter. Special attention has been paid, furthermore, to making the pupil feel comfortable on board; for the purpose the seats are adjustable in height and the rudder bar may be adjusted for distance from the seat.

Constructionally the 129 E.T.2 follows the practice of the 35 E.P.2, that is, the machine is timber-built throughout except for the wing spars which are duraluminium tubes, and the undercarriage struts which are steel tubes. The engine unit, which is mounted on duralumin tubes, is detachable by undoing a few bolts.

The vast experience which the Morane-Saulnier firm has accumulated in the long years its training school has been in existence at Villacoublay may be said to have taken body in the type 129 E.T.2, a machine so proportioned as to let the pupil do all the mistakes he can so he may realize their gravity, but with a sufficient tendency to inherent stability so the machine will " forgive the mistake."



THE MORANE-SAULNIER 129 E.T.2, with 180 Hispano, is an advance training aeroplane.

Morane-Saulnier Type 132 *Touring Aeroplane.*

This machine is essentially an adaptation of the above described advanced training aeroplane to the requirements of *grand tourisme*, or distant touring. Both machines are constructionally identical, and have the same wing area (19·7 sq. m.), but the touring type is equipped with a 120 h.p. Salmson air-cooled radial engine instead of with a 180 h.p. Hispano-Suiza.

THE MORANE-SAULNIER 132, with 120 h.p. Salmson, is designed as a touring machine.

The type 132 incorporates all the safety features and practical points which have been noted above in connection with the advanced training type of aeroplane.

Specifications of Morane-Saulnier Aeroplanes.

Type	35 E.P.2.	129 E.T.2.	132
Engine	80 h.p. Rhône.	180 h.p. Hispano.	120h.p. Salmson.
Span	10·56 m.	10·70 m.	10·70 m.
Length	6·76 m.	7·04 m.	6·86 m.
Height	3·60 m.	2·71 m.	2·72 m.
Wing chord	1·80 m.	2·00 m.	2·00 m.
Wing area	18 sq. m.	19·7 sq. m.	19·7 sq. m.
Wt., empty	450 kg.	740 kg.	655 kg.
Wt., loaded	700 kg.	1,045 kg.	930 kg.

ATELIERS DES MUREAUX

THE *Ateliers des Mureaux*, of Les Mureaux (Seine-et-Oise), will have at its stand in the *Salon* a Mureaux " Express Marin " single-seater fighter with 420 h.p. Gnôme-Rhône engine, and one of the military aeroplanes the company is building under sub-contract for the French Military Air Service, probably a Bréguet 19.A.2.

The Mureaux " Express Marin " is a tractor parasol monoplane of the strut-braced type, which is fitted with a watertight stepped hull for alighting on the sea. To facilitate this manœuvre the nose of the fuselage is flared out into wing-root like excrescences (there being no wing-tip floats), which contribute to the buoyancy and hydrodynamic stability of the machine. Besides, the undercarriage can be dropped by the pilot.

NIEUPORT-ASTRA.

THE Nieuport-Astra Company, which originated in 1915 the single-seater fighter type of military aeroplane with its *Bébé Nieuport*, is the largest purveyor of fighting machines to the French Military Air Service, where the majority of *escadrilles de chasse* are equipped with the Nieuport 29 C.1 type (300 h.p. Hispano-Suiza). The replacement of this type by a more powerful machine caused the French Under-Secretariat of Aeronautics to hold in 1924 and 1925 a competition for single-seater fighters, as a result of which orders were let to several manufacturers, including the Nieuport-Astra Company Loire-Gourdou-Leseurre, and Michel Wibault.

The Nieuport-Delage fighter adopted by the French Military Air Service, type 42 C.1 (500 h.p. Hispano-Suiza), will be exhibited at the *Salon de l'Aviation*, as will be a new category of military aeroplane, called a "light fighter," in the form of type 48 C.1 (400 h.p. Hispano-Suiza). The principal military difference between the two types is that the light fighter only carries two synchronised machine guns, whereas the heavy fighter mounts two wing guns besides.

Constructionally the two types are almost identical. The fuselage is of the monocoque type, and is built in two halves, split along the horizontal, of strips of glued tulip wood and spruce longerons. In the forward portion the fuselage is reinforced by a framing of riveted sheet duralumin which is bolted to the monocoque skin. This framing gives the machine great rigidity and resistance against torsional stresses, for it not only serves as the engine mounting, but also forms the central structure to which the upper wing and the undercarriage are fixed. The framing extends as far back as the pilot's cockpit.

The top wing has duralumin box spars and plywood ribs, while the bottom winglet is entirely timber-built. The axle

THE NIEUPORT-DELAGE 42 C.1 single-seater fighter with 500 h.p. Hispano engine.

fairing is in the shape of an aerofoil, and thus contributes to the sustentation. The top wing is braced to the undercarriage by means of Y-type struts. In the type 48 C.1 there is no bottom winglet. The wing bracing struts as well as the undercarriage struts are built of riveted sheet duralumin. The cabane struts are duralumin tubes.

Specification of Nieuport-Delage 42 C.A. Fighter Aeroplane

Engine, 500 h.p. Hispano-Suiza; span, 12·00 m.; length, 7·50 m.; height, 3·00 m.; area, top wing, 25·25 sq. m.; area, bottom wing, 4·25 sq. m.; area, axle fairing, 1·75 sq. m.; total wing area, 31·75 sq. m.; weight, equipped, 1,379 kgs.; fuel load (for 2 hours), 268 kgs.; disposable load, 161 kgs.; weight-loaded, 1,808 kgs.

Official Performances (S.T.Aé.)

Altitude. Metres.	Climbing Time. Mins.	Secs.	Maximum Speed. Km. p.h.
1,000	2	6	266·5
2,000	4	1	266·5
3,000	6	15	266·3
4,000	9	13	265·3
5,000	13	3	262·3
6,000	18	12	251·5
7,000	25	31	238·0

Ceiling, 8,000 m.; unstick run, 106 m.; landing run, 150 m.; safety factor, 15.

The disposable load includes 2,000 rounds of ammunition for the four guns, as well as signalling apparatus. The weight equipped includes all the non-dischargable weights which

THE NIEUPORT-DELAGE 48 C.1 is of the type now known in France as a "Light Fighter." The engine is a 400 h.p. Hispano.

form the standard equipment of French fighting aeroplanes, namely, instruments, machine guns, gun sights, heating apparatus, parachute, fire extinguisher, self-starter, oxygen inhalator, 64 litres of water and 42 kgs. of protective material for the fuel tanks.

Specification of the Nieuport-Delage 48 C.1 Light Fighter

Engine, 400 h.p. Hispano-Suiza; span, 10.00 m.; length, 6·40 m.; height, 2·78 m.; wing area, 18·38 sq. m.; axle fairing area, 1 sq. m.; total supporting area, 19·38 sq. m.; weight equipped (empty), 1,032 kgs.; disposable load, 98 kgs.; fuel load (1½ hours), 160 kgs.; weight, loaded, 1,290 kgs.

Official Performances (S.T.Aé. Tests)

Altitude. Metres.	Climbing Time. Mins.	Secs.	Maximum Speed. Km. p.h.
1,000	2	14	275
2,000	4	21	272
3,000	6	54	269
4,000	10	39	263
4,500	13	12	—
5,000	16	16	255
5,500	20	56	—
6,000	27	24	—
6,500	40	16	—

The "weight equipped" does not include any heating apparatus or oxygen inhalator, as they are not deemed necessary at the altitudes at which this machine will be called upon to perform.

The disposable load includes the weight of the pilot and that of 700 rounds of ammunition.

POTEZ

THE Henri Potez firm is one of the two principal purveyors of corps observation (or army co-operation) aeroplanes, that is, medium bomber-fighter two-seaters to the military air services of France and the countries of the Little Entente, Czechoslovakia excepted. Potez two-seaters have also been furnished in series to Denmark, Esthonia, Japan, Spain and Portugal.

Visitors to the *Salon de l'Aéronautique* will see this year the latest type of corps observation aeroplanes produced by Henri Potez, that is, type 25 A.2—which is the "opposite number" to the Bréguet 19 A.2, just as the Potez 15 A.2 was

THE POTEZ 25 A.2 with 450 h.p. Hispano engine, is an army co-operation biplane of recent design.

the opposite number to the Bréguet 14 A.2. In addition, the Potez Company will exhibit two aeroplanes of a type which is designated in France under the letters G.R., meaning, indifferently, *grand raid* or *grande reconnaissance* (distant cruise or distant reconnaissance, respectively). One will be the 25 G.R. with 450 h.p. Lorraine-Dietrich engine, on which Capt. Pelletier Doisy and Lieut. Gonin covered last summer a circuit of the Mediterranean (Paris-Rome-Tunis-Casablanca-Madrid-Paris) of 6,500 kms. in 41 hrs. 40 mins. elapsed time, involving night flying from Tunis to Casablanca. The same machine was used by Capt. Arrachart and Engineer Carol on the high-speed circuit of the European capitals in August, 1925, when they covered a distance of 8,000 kms. in less than three days. The other *grand raid* machine exhibited on the Potez stand will be the type 28, with 550 h.p. Renault geared-down engine, on which the Arrachart brothers established a world's straight-line distance record by flying from Paris to Basrah, on the Persian Gulf, last June (4,313 kms. in 26 hrs. 30 mins.).

Potez 25 A.2 Observation Aeroplane

The Potez 25 A.2 observation aeroplane is a tractor biplane characterised by a very large top wing and a small bottom wing, thus affording the occupants a maximum of vision. The wings have a framing of timber and plywood ; the cabane struts and the interplane struts are faired steel tubes. The fuselage comprises structurally three sections : the forward section consists of an interchangeable engine mounting of riveted-sheet duralumin, which is secured with four bolts to the central portion of the fuselage ; the latter covers the entire habitable portion of the machine and is built up of spruce longerons and cross-pieces, with plywood covering. The rear portion of the fuselage is similarly built, except that the plywood covering is replaced by wire bracing and fabric covering.

THE POTEZ 25 G.R. with 450 h.p. Lorraine engine, is a long-distance reconnaissance biplane.

The interchangeable engine mounting takes indifferently any power plant of from 400 to 500 h.p. So far, the following engines have been mounted on the Potez 25 A.2 : 450 h.p. Lorraine-Dietrich, 420 h.p. Gnôme-Rhône Jupiter, 450 h.p. Hispano-Suiza, 480 h.p. Renault and 500 h.p. Farman.

The undercarriage is built of duralumin tubes, with a divided axle ; rubber discs enclosed in the outer front struts serve as shock-absorbers.

The Potez 25 A.2 is normally armed with four machine guns, one of these being synchronised with the engine, two being mounted on a gun ring and the fourth being fixed on the floor of the rear cockpit for firing under the tail through a trap door. According to the type of bomb rack employed, the machine may carry either twelve 10 kg. bombs inside the fuselage or else sixteen or twenty-four 10 kg. bombs on the lower wings.

If it is desired to use this machine for distant reconnaissance work, the bomb load is eliminated, but an additional machine gun is mounted in synchronisation with the engine and the ammunition supply of all the guns is doubled.

The Potez G.R. Distant-Cruise Aeroplanes

The Potez 25 G.R. distant-cruise aeroplane is almost identical with the Potez 25 A.2 observation machine ; it only differs from the latter by having supplementary fuel tanks which increase the machine's range to 14 hrs., corresponding in still air, at a cruising speed of 180 k.p.h., to a distance of 2,500 km. Of course, the G.R. machine does not carry any armament, at any rate, not during record attempts.

The Potez 28 G.R. aeroplane of Paris-Basrah fame is very similar in construction to the above-named types, except

THE POTEZ 28 G.R. has a 550 h.p. Renault geared engine.

that the fuselage framing is reinforced to carry the huge supplementary fuel tanks which are fixed to the underside of the fuselage and which give the machine a range of approximately 5,000 km. in still air.

While the Potez 28 G.R. is normally equipped with the 550 h.p. Renault geared-drive engine, it may also be equipped with the 500 h.p. Farman geared down engine.

Specification of the Potez 25 A.2 Aeroplane

Engine, 450 h.p. Lorraine-Dietrich ; span, 14 m. ; length, 9 m. ; height, 3·50 m. ; wing chord, top, 2·50 m. ; wing chord, bottom, 1·40 m. ; gap, 1·90 m. ; wing area, top, 34·10 sq. m. ; wing area, bottom, 12·60 sq. m. ; wing area, total, 46·70 sq. m. ; weight, empty, 1,210 kg. ; military load, 500 kg. ; fuel load, 288 kg. ; weight, loaded, 1,998 kg.

Official Performances in S.T. Aé. Tests

Altitude. m.	Climbing Time. m. s.	Max. speed. km. p.h.
Sea level		211
1,500	4 55	217
2,000	6 48	216
3,000	10 23	212
4,000	14 45	208
5,000	20 21	200
6,000	29 46	

Ceiling, 7,400 m.

Weights and Performances of the Potez 25 G.R.

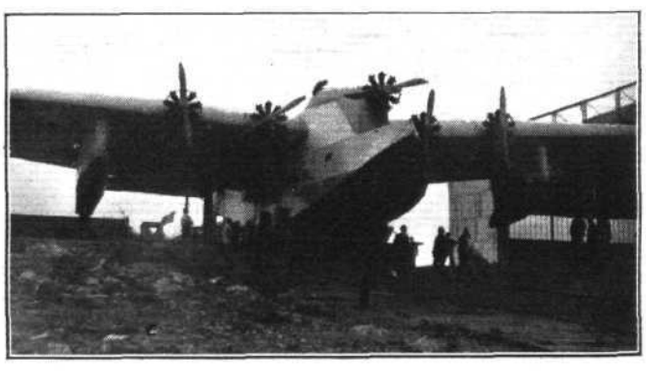
Weight, empty, 1,220 kg. ; crew and equipment, 250 kg. ; fuel (1,200 litres of petrol and 60 litres of oil), 895 kg. ; weight, loaded, 2,365 kg. ; ceiling at start, 5,800 m. ; maximum speed at half-load, 225 km.p.h. ; cruising range, 14 hrs. (2,500 km.).

Specification of the Potez 28 G.R. Aeroplane

Span, 16·20 m. ; length, 11 m. ; height, 4·10 m. ; wing chord, top, 2·90 m. ; wing chord, bottom, 1·60 m. ; wing area, top, 46·40 sq. m. ; wing area, bottom, 16·60 sq. m. ; wing area, total, 63 sq. m. ; weight, empty, 1,900 kg. ; crew and equipment, 240 kg. ; fuel, 2,630 kg. (3,400 litres petrol and 280 litres oil) ; weight, loaded, 4,770 kg. ; maximum speed, with half-load, 210 km. p.h. ; ceiling, at start, 2,500 m.; ceiling, with half-load, 5,200 m.

SAINT NAZAIRE PENHOËT

THE *Chantiers et Ateliers de St. Nazaire Penhoët*, one of the largest shipbuilding firms of France, which built the biggest liners of the French Line, such as the *France*, the *Paris* and the new *Ile-de France*, recently instituted an Aeronautical Department, the chief engineer of which is M. Richard.



The Saint-Nazaire " Richard-Penhoët " flying boat is fitted with five " Jupiter " engines. It has a span of 40 m.

DECEMBER 2, 1926

FLIGHT
AIRCRAFT ENGINEER AIRSHIPS

BRITISH AIRCRAFT
SECTION OF 'FLIGHT'

The BLACKBURN AEROPLANE & MOTOR Co., Ltd.

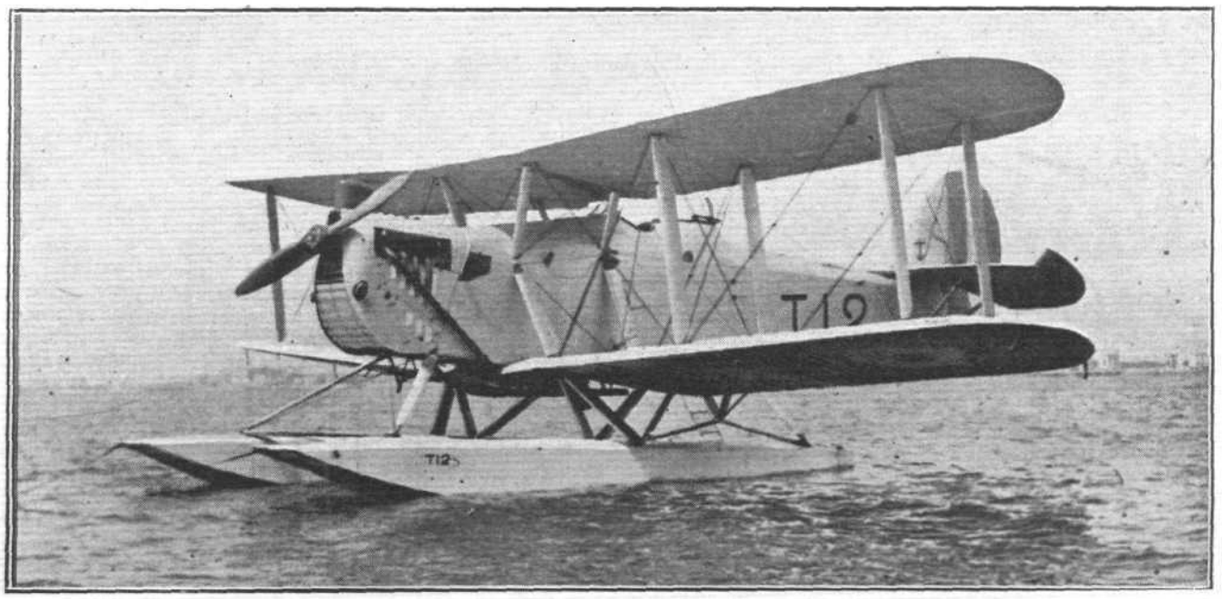
THE present company was formed at Olympia, Leeds, in June, 1914, by Mr. Robert Blackburn, one of the pioneers of British aviation, who designed, built, and flew his first aeroplane in 1909. To-day, with Mr. R. Blackburn as managing director, Major F. A. Bumpus as chief designer, and also director, and Major J. D. Rennie as flying boat and seaplane designer, the firm possesses a large up-to-date factory on the old site at Olympia, Leeds, and an additional experimental and erection base, with an aerodrome, extensive hangars and seaplane slipways, at Brough, E. Yorks.

In the early days of the war the company adopted a policy of specialisation in naval types of aircraft, paying particular attention to coastal defence types and especially the development of torpedo-carrying aeroplanes and seaplanes. Adherence to this policy has not only brought about the production of highly efficient aircraft for coastal defence purposes, but also, owing to the exacting nature of the conditions to be met in this type of work, and particularly in the requirements of ship-carried aircraft, has enabled the firm with equal success to extend their activities to cover other types for military purposes and also training and commercial aircraft.

Torpedo Aircraft. Among the post-war Blackburn coastal defence aircraft are many interesting types of torpedo, fleet spotting and reconnaissance aeroplanes, seaplanes and flying boats. Of the more modern types, some of which have lately been added to the Service and others are in construction stages, information is, however, necessarily restricted by secrecy conditions. In 1920 the "Swift" torpedoplane (450 h.p. Napier "Lion" engine) was produced as a single-seater torpedoplane with a land type chassis. This machine was exhibited at the Olympia Show of that year and its value was soon recognised by the British and foreign Governments, the first of this type being acquired by the British Government and subsequent machines by America, Japan, Spain, and other countries. Later, a modified "Swift," known as the "Dart," was adopted as the standard torpedoplane of the British Royal Air Force, and the company had the honour of equipping several squadrons with machines and spares which are giving excellent service to-day.

Both the "Swift" and "Dart" embody a type of construction which has proved ideal for its purpose; these machines are built up on a detachable unit system the main structure being of steel tubes, so that maintenance is simplified, and the facility for effecting repairs and replacements enables machines to be kept in regular service with consequent efficiency and economy. Both types were originally designed as deck-landing machines with land type chassis and folding wings. Incidentally the "Swift" was the first machine with staggered wings designed to fold. Each at first intended to carry an 18-in. torpedo weighing 1,500 lb., or torpedoes of similar size and weight, was then developed to carry an alternative equivalent load of bombs. Then the types were fitted with float chassis so that the capabilities of each were extended to meet the requirements of torpedo or bombing operation either from land, carrier-ship or sea.

A later type developed from the "Swift" and "Dart" is the "Velos," which is now being produced for the Greek



The Blackburn "Velos" (Napier "Lion" Engine).

Government. This type is also fitted with a Napier "Lion" engine, and is a two-seater torpedoplane or bomber, the extra seat being occupied by a gunner with Lewis machine gun or alternatively by a pupil with dual control. It is also a land machine or seaplane, the wheel and float chassis being interchangeable and capable of operation from a carrier ship.

Continuing the developments on a much larger scale, the Blackburn "Cubaroo," with the 1,000 h.p. Napier "Cub" engine, is a heavy torpedo 'plane or bombing machine capable of long-distance operation independently or in co-operation with the Fleet. It is designed to carry a torpedo of 21 ins. diameter, weighing a ton and a half (3,360 lbs.), or an equivalent alternative load of bombs, and is extensively equipped with defensive armament. A further development of the same type is available as a twin-engined machine. Particulars of the "Ripon" torpedo-plane, delivered to the Royal Air Force this year, and of other torpedo aircraft now under construction, are not available.

Fleet Spotter and Reconnaissance Types. The "Blackburn" is an example of the firm's Fleet spotting aircraft. This machine embodies many of the constructional details of the "Swift" and "Dart" types, and is also available as a land machine, ship-plane, or seaplane. The floats are fitted with special keels upon which the machine can be landed upon the deck of a ship.

For long-distance reconnaissance work the firm have recently produced a large type of flying-boat, named the "Iris," for the British Air Ministry. Fitted with three Rolls-Royce "Condor" engines of 650 h.p. each, this huge craft is capable of long-range work over sea with almost certain immunity from forced descent, owing to the fact that it is capable of sustained flight with two engines only in action, and of comparatively long distance with gradual loss of height with one engine only.

A Training Machine For training purposes the Blackburn "Sprat" (275 h.p. Rolls-Royce "Falcon" engine) has been produced primarily for deck-landing training. It is not confined to any one branch of training work seeing that it may be used also as a land machine or seaplane, the wheel and float chassis being interchangeable. On account of its wide performance range and general flying qualities, it is proportionately comparable with the majority of present-day service types, and for this reason the firm claim that it may be used with safety and advantage as the only type necessary for preliminary or advanced instruction before the flying of almost any other type.

Civil Aircraft. On a smaller scale the "Bluebird" light aeroplane (60 h.p. Armstrong-Siddeley "Genet" engine) is an example of a practical small aeroplane, either for preliminary training purposes or for the owner-pilot. In this machine the two seats are placed side by side, with the result that flying instruction can be carried out under very favourable conditions, and pleasure flying with a sociability impossible with the usual tandem seating. It should be mentioned that it was a machine of this type which won the Grosvenor Cup race at the Lympne race meeting this year, the Open Handicap race at the Yorkshire Aeroplane Club's Aerial Pageant, and second place in the Open Handicap at the Lancashire Aero Club's race meeting.

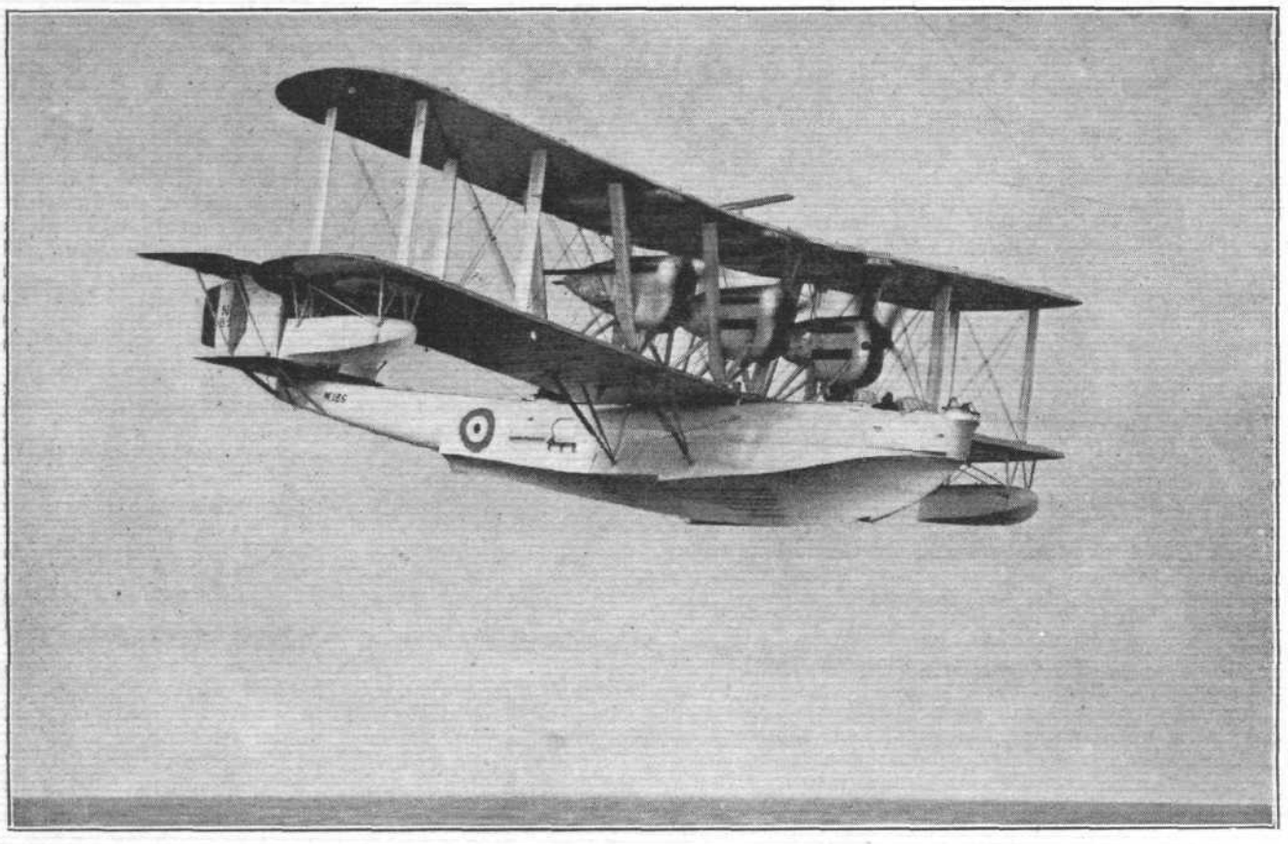
For commercial purposes the firm are developing a single-engined four-seater as a type of land or sea taxi-plane for business or pleasure purposes. Design work for long-distance passenger and goods multi-engined aeroplanes and flying-boats is also in hand.

Practical Aviation. Subsidiary to the Blackburn Co. is a company known as North Sea Aerial and General Transport, Ltd. For the last three years this company has been operating a flying school at Brough, near Hull, where both land and sea flying training is undertaken, the former from the company's aerodrome, which is along the banks of the Humber, and the latter from the river itself. An expert staff of instructors and engineers is maintained, and Blackburn training types are operated with continuous success, over a hundred and twenty officers of the Royal Air Force Reserve passing through the school yearly on their annual flying courses. This company is also prospecting for commercial air transport routes in various parts of the British Empire, and has almost completed the final arrangements for the commencement of a commercial seaplane service in Africa.

The North Sea Co. not only undertakes flying training work in connection with the R.A.F. Reserve, but is also prepared to teach British or foreign officers or civilians, and to give a thorough grounding in technical subjects connected with aviation, in navigation, meteorology, maintenance of aircraft, and practical work in the shops.

Foreign Work. The company's work abroad is also of interest. In addition to supplying foreign governments with aircraft, the company, in the case of Greece, has sent out an expert staff to organise the government aircraft factory at Phaleron, near Athens, and to supervise the construction of Blackburn torpedo 'planes for the Greek Naval Air Service.

The company's head office is Olympia, Leeds.



["FLIGHT" *Photograph*

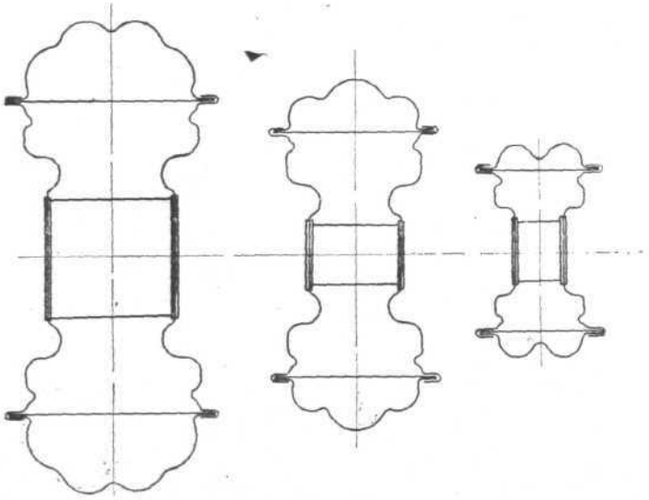
The Blackburn "Iris" 3 Rolls-Royce Condor Engines.

BOULTON & PAUL Ltd.

OUR readers are already well acquainted with the part which Boulton & Paul, Ltd., have played in the development of metal construction for aeroplanes, and we have, from time to time, published descriptions of various machines produced by them, in which particulars of the earlier development of the system have been given.

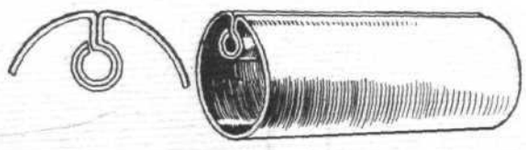
The more recent activities of this company have been devoted, apart from the design of specific aeroplanes, to a general extension of their patented system on a standardised basis, which will ultimately make it directly applicable to aircraft of a very wide range of types.

This object is being achieved by the standardisation of a number of sections which, while providing the widest possible latitude, at the same time strictly limit the number of tools and operations required for assembly and erection. The special plant, tools and skilled and experienced supervision required for the formation of sections are too much to be carried by every firm wishing to engage in metal construction, and for this reason, Boulton & Paul have, at considerable expense, equipped and staffed a special department at their factory to carry out this work for themselves and their licensees. The basic features of Boulton & Paul sections, and the simple method of attaching fittings, are already well known. By the provision of three standard web section forms and six flange section forms, with suitable tools for producing them from strips of varying thickness, a range totalling over 2,000 spars, suitable for use in aeroplanes from 2,000 lbs. to 20,000 lbs.



Boulton & Paul's standardised metal sections.

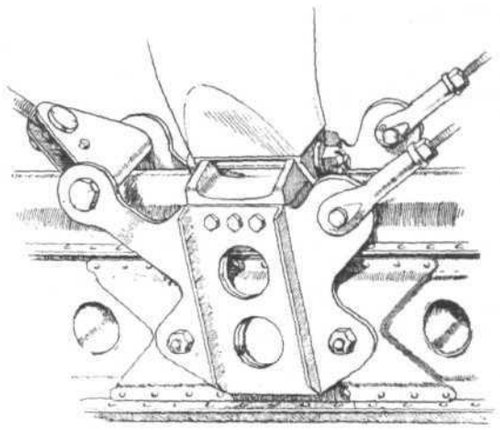
total weight, is available. By suitably combining the various sections, a fine graduation in strength is obtained, and for a given depth of wing, the choice may be made from 18 different spars, the strength characteristics of which are accurately known and tabulated. Special sections for longerons, or drag struts, ribs and other members are similarly graduated, and are supplied normally in lengths up to 70 ft., although if specially required, the length can be increased to 150 ft. These sections include a locked joint tube, which can



Boulton & Paul's locked joint tube.

be manufactured not only in great lengths, but in high-tensile nickel chrome or stainless steels and light alloys, and in very small thickness/diameter ratios, *e.g.*, 2 ins., 26 gauge, in all gauges from 30 gauge upwards.

The dimensions of all spars are so standardised that the dimensions associated with the joining or riveting are common to all, thus the riveting tools or machines will take the whole range. As only three web sizes are required, three sets of tools will cover all the jigs, etc., and the standardised attachment fittings. Plates for the attachment of fittings are made of high-tensile steel in three standard widths, stamped out at the works to suit the spar selected. It will be seen that the adaptation of the Boulton & Paul system of construction to any normal design of aeroplane is a very simple matter



Boulton & Paul's standardised spar joints.

indeed, necessitating very little expense or delay. In addition, it is always possible to order spares or replacements by quoting the number of the section and specification number of the material, with the certainty of obtaining members identical in every respect with those originally supplied.

Another great advantage to the aeroplane builder is the lack of necessity for any elaborate furnace equipment. No heat-treatment whatever is required to be given the material after leaving Boulton & Paul's works, except the ordinary salt bath treatment for light alloys and for the re-tempering of any high-tensile steel fittings which it is necessary to bend.

An important development, without mention of which this review would be incomplete, is in the continuous process by which all Boulton & Paul sections are heat-treated after forming.

The steel strip used in the formation of sections for spars or similar members has hitherto been heat-treated at the steel works and rolled or drawn in the hard state. By heat-treating the strip in coils it has been found impossible to obtain uniformity of treatment, and an extensive series of tests has revealed considerable variations in strength and ductility between different parts of the same roll of strip. This resulted in distortion of sections in forming, and other difficulties, in order to avoid which a special plant has been designed and installed, enabling the strip to be formed in the soft state and heat-treated continuously after passing through the dies. This method guarantees absolute uniformity of treatment throughout the length of a member, and, in addition, careful tests of strength and hardness are made, both before and after forming. A stress-strain diagram is prepared from tensile tests of all incoming materials, and carefully checked. The tests for hardness are made on a Rockwell testing machine, which enables comparative readings to be taken at a number of points along a finished section without damaging the material, and which can be referred to readings which have been taken on samples of a similar material whose properties have been determined from a stress-strain diagram. In this way, all irregularities in material are eliminated. The built-up spars, struts, etc., are tested for strength under various conditions of loading and the results charted and analysed, a complete photographic record being kept of all failures. Thus a wealth of knowledge and experience has been accumulated, which is available for use in design.

The wide experience of Boulton & Paul, Ltd., in metal aircraft design is being utilised in the construction of the new giant airship R 101, and marked increases in the efficiency of girder members have been made, compared with methods of airship construction hitherto employed.

FLIGHT
THE AIRCRAFT ENGINEER AND AIRSHIP

DECEMBER 2, 1926

The BRISTOL AEROPLANE Co., Ltd.

WHEREVER "Bristol" aeroplanes are used—and they are in service in most parts of the world—their high standard of quality is recognised. Since "Bristol" aircraft were first seen in flight nearly seventeen years ago, the question of quality has always been kept in the forefront—quality of design, quality of material, quality of workmanship—and it is a rigid adherence to the slogan that "nothing but the best is good enough for a 'Bristol'" that has formed the foundation upon which the very solid reputation of the "Bristol" aeroplanes is based. "Ship-shape and in Bristol fashion" was the measure by which the old Elizabethan sea-dogs judged their craft; "The 'Bristol' fashion" is still the standard by which the modern pilot of the air adjudges quality in an aircraft.

For seventeen years the Bristol Aeroplane Company, Ltd., has held its place in the forefront of aeronautical development. Experimental work on a wide basis is continually in progress and the result of these efforts is embodied in the "Bristol" machines. For some years past, for instance, the Bristol Company have been steadily developing their organisation for the construction of all-metal aircraft, so that to-day not only have they one of the best-equipped departments in the country for this class of work, but they have also developed types of all-metal aircraft which have proved after long flying service to be machines of exceptional efficiency. These have ranged from a small cantilever monoplane of 800 lbs. weight to a type of 8,000 lbs.

The "Bristol" Boarhound.

A good example of "Bristol" all-metal construction is the "Bristol" Boarhound, an efficient biplane for use as a two-seater fighting or reconnaissance machine or as a day bomber. The structure is entirely of metal with the exception of the fabric covering, and 95 per cent. is of steel.

The "Bristol" Boarhound.

Following the general principles which have been developed in "Bristol" all-metal machines, the construction is such that in the event of small local damage, repairs can be carried out rapidly by any average mechanic. In the event of more extensive damage due to bad landings or crashing, the design is such that, for instance, joining by riveting in the wings has been reduced to a minimum so that even should a spar be buckled beyond repair, which in the case of a timber-built machine would entail a total loss, the member may be taken out of the wing and replaced with very little labour. For the same reason, the fuselage is constructed of easily-detachable components.

Especial attention has been devoted in the "Bristol" Boarhound machine to ensuring that both pilot and gunner shall have a wide field of view.

Dual control is provided in this machine with tail actuating gear, and all moving parts are fitted with lubricators. Control surfaces are balanced to give light operation at all speeds and "Bristol"-Frise type ailerons, which have a very small yawing effect, ensure control at stalling speed.

There is plenty of space available for the stowage of a comprehensive military load which includes a Vickers' gun in the pilot's cockpit, and a Lewis gun on Scarff ring mounting in the gunner's cockpit, together with bombs, wireless apparatus, camera, oxygen and signalling apparatus, &c. The engine fitted is the latest type "Bristol" Jupiter Series VI, and this is fitted with a complete exhaust ring and tail pipes in order that all exhaust gases are conveyed beyond the cockpit. This has the additional advantage that the flame from the exhaust is completely hidden, thus rendering the machine very suitable for night flying.

Petrol is carried in two tanks which can easily be removed, carrying 56 gallons, and fitting in the wings. An additional 46 gallons tank is mounted in an accessible position on the top of the fuselage, and here also accommodation is found for a 9-gallon oil tank. Oil temperature is regulated by an oil cooler fitted underneath the fuselage and provided with an automatic by-pass device for regulating the oil temperature.

The span of the machine is 44 ft. 9 in., its length 30 ft. 7 in., and its height 11 ft., whilst the track of the wheels is 6 ft. 6 in. With regard to areas, the wings have a surface of 464 sq. ft., the tail plane of 28 sq. ft., the two elevators of 25 sq. ft., rudder of 14 sq. ft., and fin of 2·2 sq. ft. The weights of the Boarhound are as follow :—

	Lbs.
Weight complete empty with Jupiter engine and tankage for 102 gallons of petrol and 9 gallons of oil	2,440
Additional structure to carry all items of equipment	90
Fuel and oil 77 gals. petrol 586 lbs. 7 ,, oil .. 70 ,, ——	656
Crew	360
Military equipment (guns, ammunition sights, camera, electrical equipment, etc.)	448
Lbs.	3,994

With reference to performance, the machine has a top speed of about 135 miles per hour and a landing speed in the neighbourhood of 50 miles per hour. The climb of the machine to 5,000 ft. can be accomplished in 4½ mins., to 10,000 ft. in 10 mins., and to 15,000 ft. in 18 mins., the service ceiling being 21,800 ft. and the absolute ceiling 23,600 ft.

During extensive flying by many pilots this machine has been found easily manœuvrable and quickly responsible to its controls and certainly from the pilot's point of view its flying qualities have been very highly appreciated.

"Bristol" Lucifer School Machine.

The "Bristol" Lucifer School Machine has established an enviable reputation as the most efficient type of aircraft which can be obtained to-day for general instructional purposes. It is, in the first place, a machine of exceptionally simple construction with practically nothing to require attention. The questions of strength and simplicity were very carefully studied in the design and as a result, for instance, top and bottom wings are interchangeable, whilst the metal struts are of "N" formation so that no trueing up is required. The oleo spring undercarriage fitted has proved itself of exceptional efficiency, whilst the 120 h.p. "Bristol" Lucifer Series IV engine which is fitted is now very widely recognised as the simplest and most reliable engine of its power.

The "Bristol" Lucifer School Machine is easy to fly, but at the same time it is exceedingly light on the controls and has very much the "feel" of a single-seater scout. As a result pupils who receive training on this type of aircraft are really turned out as efficient pilots.

In school work there are two factors which have to be borne in mind—safety and economy. With regard to the first of these it is sufficient to state that in one flying school in which "Bristol" Lucifer School Machines have been used as standard for nearly four years there has never been a single forced landing from engine trouble nor a mishap of any kind and this despite the fact that approximately 600 pupils have received training. The machines during this period have required very little attention and in point of fact have given service day after day throughout the entire period. Equally striking is the experience of the Chilean Air Force, who have adopted machines of this type for training purposes. A

Bristol "Lucifer" School Machine.

report recently received from the technical officer in charge of these machines touches upon this matter as follows :—

"As far as machines and engines are concerned we cannot speak too highly of them. The machines are nice to fly, strong, easy to repair and will do everything asked of them. The engines seem to be the result of a life-time's study on what is required for a training machine. Our people are simply mad over them. We have Lucifers working with over 70 hours' flying without even changing a plug. From my point of view, as far as the training squadron is concerned, my work is a pleasure after dealing with rotaries for so many years. Out of 18 pupils I think there are 14 solos. This in so short a space of time was only possible because of the engine which is so simple to maintain and so easy to manipulate ; it has conquered the confidence of every-one. Our consumption is very low compared with the rotaries for the same work. Per hour we are using about 20 litres of petrol (20 per cent. benzol) and about $\frac{3}{4}$ to 1 litre of oil."

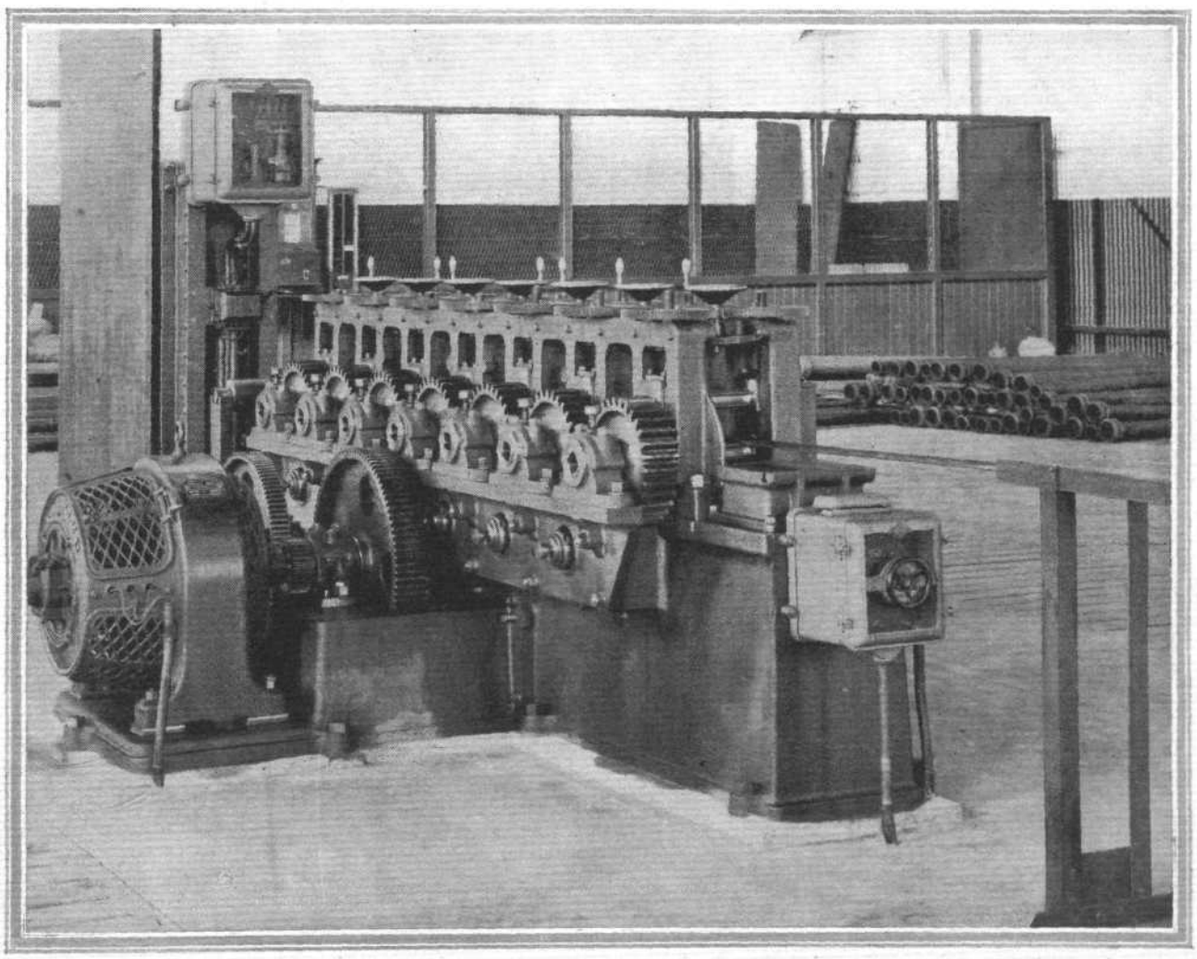
In the history of instructional flying it would surely be difficult to bring forward two examples of all-round efficiency, economy and safety than has been demonstrated in these two instances. The Lucifer School Machine is also in service in other countries with equally satisfactory results.

The "Bristol" Advanced Training Machine.

For advanced instruction in flying the "Bristol" Aeroplane Company have developed a type of aircraft similar in its main features to the famous "Bristol" Fighter and fitted with the "Bristol" Jupiter radial air-cooled aero engine. Many improvements have been incorporated in this type, such as the provision of full dual control, balanced ailerons, rudder, etc., improved tail skid and a highly efficient oleo undercarriage. This type of machine is in use for the training of reserve pilots of the Royal Air Force at two of the leading flying schools in this country.

The "Bristol" Fighter, modified and improved in many ways as compared with the early "Bristol" Fighter model which first appeared upon the battle fronts in 1917 and which proved itself the finest two-seater fighter aircraft of its period, is still a standard two-seater machine in use by the Royal Air Force, as well as by the aerial forces in many countries including Belgium, Poland, Norway, Argentina, etc.

The Bristol Aeroplane Company are the manufacturers of aircraft for all purposes, but space does not permit of machines being dealt with in detail. Mention may, however, be made of the "Bristol" Brownie Monoplane, a light single or two-seater aircraft fitted with the "Bristol" Cherub engine which has gained numerous awards in light aeroplane competitions in this country during the past two or three years ; of the "Bristol" Berkeley Bomber, a highly efficient all-metal machine fitted with the 600 h.p. Condor engine ; and of the "Bristol" Taxiplane, an aircraft fitted with the 120 h.p. "Bristol" Lucifer engine carrying pilot, two passengers and a certain amount of baggage. This machine is of strong and simple design and actual operating costs do not amount to more than one penny per passenger mile.



The "Bristol" Metal Working Shops.

The DE HAVILLAND AIRCRAFT Co., Ltd.

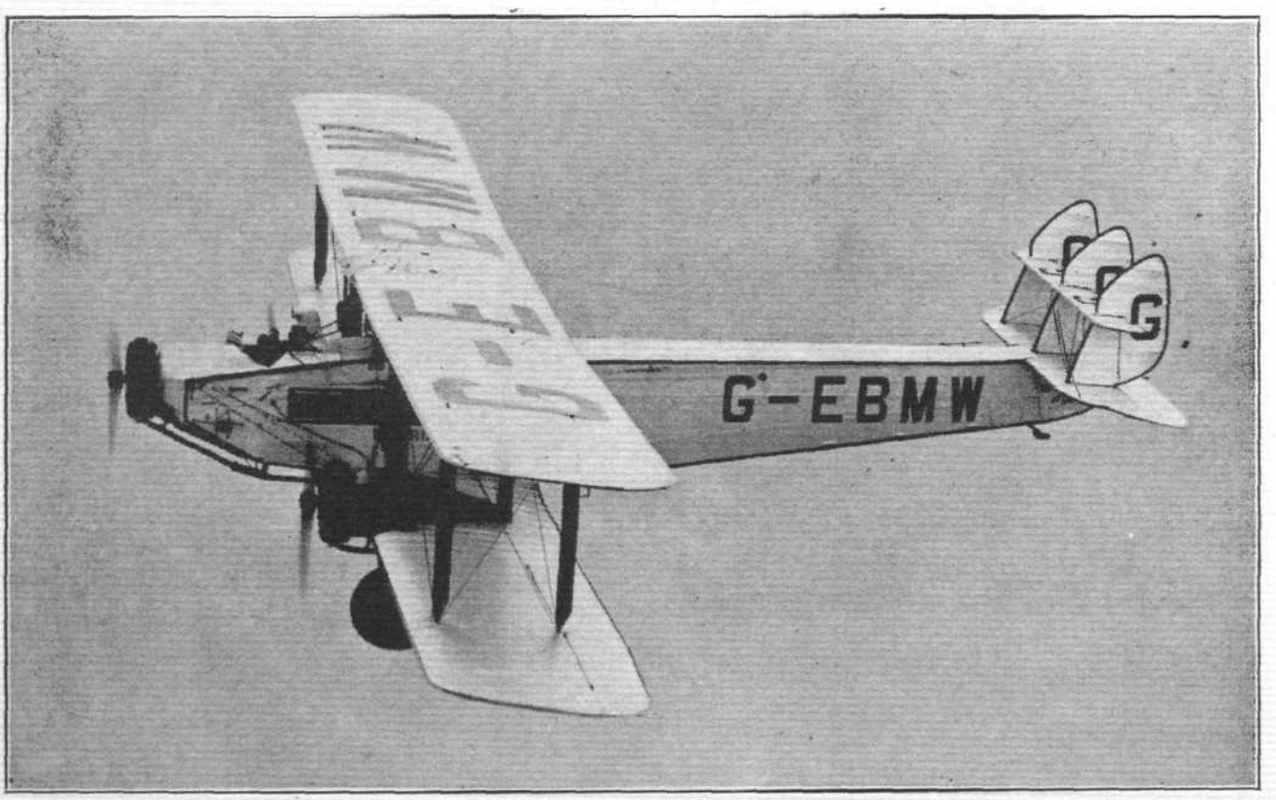
CAPT. GEOFFREY DE HAVILLAND, head of the De Havilland Aircraft Co., Ltd., is one of the pioneers of British aviation. Since the war this firm has specialised upon the production of civil and commercial aircraft, and in this class of machine the firm's products range from the little D.H.53 with a 6 h.p. motor-cycle engine, to the new D.H.66 " Hercules " with three 450 h.p. Bristol " Jupiter " engines. The D.H.9A two-seater reconnaissance aeroplane is still the standard " Moth " and the D.H.50 can be supplied either as aeroplanes or as seaplanes.

The De Havilland School of Flying, situated within 8 miles of Central London, is the largest flying school in the British Empire. Elementary training is given on " Moths," from which type it has been found that pupils pass easily to D.H.9J's fitted with 385 h.p. Armstrong-Siddeley " Jaguars," which are used for advanced training. Instruction is given in commercial, private and military flying, and the charges made are based upon the number of hours flown. Instruction can be commenced at any time.

The De Havilland school is the training centre of the R.A.F. Reserve.

The D.H.50 fitted with Siddeley " Jaguar " engine, flown by Sir Alan Cobham to Rangoon and back, Cape Town and back, and Melbourne and back. This actual machine has covered over 125,000 miles in extremes of climatic conditions.

A " Moth " in flight. This type is the standard training equipment of all the British and Australian Flying Clubs, the Irish Free State Air Force and many other organisations. It is also used by many private owners as an ariel roundabout.



The de Havilland " Hercules " in flight. Five of these machines, fitted with three Bristol " Jupiters," are being built for the desert air route from Cairo to Karachi. The " Hercules " will take off fully loaded with only two engines running, and only loses height slightly flying on one engine.

The FAIREY AVIATION Co., Ltd.

IT would be, perhaps, more desirable when dealing with, the products of such a firm as the Fairey Aviation Co., Ltd. of Hayes, to look back during the past year or so upon the series of events which have helped to confirm the prominent position these well-known aircraft have held so long in the aeronautical world. Those machines which the public have already had the privilege of investigating are too well known to require any reiteration of detail. There are, of course, many new Fairey aircraft, both in being, and on the way, which would be of absorbing interest, were it possible to divulge their secrets, but that may not be, at least at present. However, a brief retrospection of the period of aeronautics just past should be of considerable interest.

Undoubtedly, the first event to come to mind is that splendid feat, the R.A.F. Cairo-Cape Town-Cairo-England flight, which is certainly one of the most, if not the most, outstanding events in aeronautical history up to the present time. Although modestly called "an ordinary Service flight," it will be remembered what a remarkable feat this was. Undertaken by the same four Fairey III. D. aircraft and flown to a definite schedule as well, it constitutes a new record of reliability and pioneer work.

Eleven thousand five hundred miles across Africa from Cairo to Cape Town and back again and then on to England, over land and sea, through intense heat and cold and all the particular kinds of weather common to such variations of temperature—these were the conditions through which the four Fairey III. Ds. had to fly. These machines, however, as well as other Fairey aircraft, no doubt stand the test so well, as their design is so thoroughly thrashed out in the drawing office before production.

This achievement adds yet one more to the many already accomplished by this well-known series of aircraft. It will be remembered that it was to Wing-Comdr. Goble, C.B.E., D.S.O., D.S.C., that the Britannia Trophy was awarded for his flight round Australia three years ago in a III. D seaplane. During the past year much has been made of the trans-Atlantic flight undertaken during this period, but, without detracting from the merit of this excellent flight it must be pointed out that over four years ago Commander Sacadura-Cabral flew the South Atlantic using Fairey III. D aircraft. The Fairey III. D seaplane is, of course, a single-engine machine and, as such, is the only one to fly the Atlantic.

Another event during the past year which has marked yet one more step forward is the coming of the Fairey "Fox," a day bomber, into actual service. The furore that the "Fox" created when its general features first became known is still fresh in our minds, how its phenomenal advance in performance, its tremendous speed, its graceful lines all made such a widespread and vivid impression and which will give it for some long time to come a very prominent place among the world's aircraft. In fact its advent has shown it to be the inspiration of this period. Its performance and the general quality of its design are such a pronounced step forward that the "Fox" is undoubtedly the prototype of a new class of day bomber, and so will it remain until further inspiration and discovery arrive.

Those who visited the R.A.F. Display at Hendon this year must all have seen the Fairey "Firefly," the latest thing in single-seater fighters. Though this was its first and only public appearance, its welcome was exceptionally warm. The eulogies of the daily press were both spontaneous and convincing; for instance, a leading daily said of it: "The 'Firefly' is one of the most vicious-looking single-seaters that has ever been produced. It is almost a perfect streamline from nose to tail, and its speed appears to be very high." And another: . . . a beautiful little craft and a triumph of British design and workmanship. . . ." these two instances being examples of the general trend of opinion, and it may be said that these views are more than emphasised by actual performance.

The R.A.F. ship's fighter, the Fairey "Flycatcher," and the reconnaissance-day bomber, the Fairey "Fawn," of which there are so many in the Service, are both still more than "pulling their weight," and are too well known to need any further comment.

THE FOX DAY-BOMBER: This photograph shows the clean lines and small frontal area of the Fairey "Fox." The suppression of all excrescences which might cause head resistance is particularly evident.

We have recently heard much of various large seaplanes, several of which have been acclaimed as the world's largest, but the Fairey "Titania," with its wing span of 139 ft., and total horse-power of nearly 2,800, still gives Great Britain the lead in this respect. The "Titania" is a development of the "Atalanta," and is of the same dimensions. The horse-power given by the engines in the earlier model was somewhat less. It is interesting to note that the "Atalanta" was in the air flying satisfactorily over six years ago, which goes to show how far ahead of its time the "Atalanta" was.

Finally, mention must be made of the Fairey-Reed metal airscrew. It is evident that this year has brought the metal airscrew into its own. With the increase in performance required as aircraft have developed, and the greater necessity for thorough reliability, the metal airscrew has been more and more looked to, until to-day one finds all the newest aircraft fitted with this important accessory. The Reed type of airscrew is undoubtedly one of the most important, and many of the greatest achievements have been accomplished by aircraft fitted with these airscrews. For instance, Commander Byrd, in his North Pole flight, used a Reed airscrew. All the world's high speed records are held by aircraft using these airscrews. The winning aircraft in the 1926 King's Cup air race used a Fairey-Reed airscrew as did the winner of the S.M.M.T. Prize at Lympne, 1926, meeting. The winners of the Schneider Cup races since 1923 up to, and including this year, have been fitted with Reed airscrsews, a proof of their speed qualities and reliability.

HANDLEY PAGE, Ltd.

Handley Page "Hyderabad" Night Bomber

THE Handley Page "Hyderabad" night bomber is the military development of the "W" types of aircraft which have so successfully carried on the commercial services between Great Britain and the Continent. It is fitted with Napier "Lion" engines, developing 470 h.p. at 1,320 r.p.m. on the propeller, as the normal power, and 500 h.p. at 1,450 r.p.m. as the maximum.

The main change from the commercial type is in the arrangement of the fuselage. The forward, or nose portion, is now arranged with the gunner, pilot and passenger in tandem, the gunner occupying the position right in the nose and the tandem seats of the two pilots giving a splendid range of view on both sides of the machine. The interior of the cabin is of the same ample dimensions as in the commercial machine, so that there is ample room to move about inside and for any members of the crew to change position. Aft, a further gun position is fitted both above and below the fuselage. The monoplane tail and rudder occupies a minimum amount of dead area in the region of fire aft.

The petrol tanks are carried underneath the top plane and supply the engines by gravity feed. There is thus the simplest possible petrol system and the one least likely to go wrong. Two sizes of tanks can be fitted, one carrying 350 gallons and the other 550 gallons of petrol, with corresponding durations of 7 and 11 hours' flight at crusiing speed respectively.

The specification of the machine is given below, and the general arrangement is shown in Fig. 1.

The Handley Page Slotted Wing

For the past few years Handley Page, Ltd., have been engaged upon research work of fundamental importance which has led to the development of what is now known as the Handley Page Wing. It has been found if a wing of ordinary type is pierced near the leading edge by a slot of peculiar shape, sloping backwards from the under surface to the upper, that that wing will develop a very much higher maximum lift than will the same wing minus the slot. Also that a series of similar slots, extending across the wing and dividing it up into a series of narrow chord wings, can be used still further to increase the maximum lift.

The effect is very large—60 per cent. extra loading may be carried by a wing, without increasing the landing speed, by the use of only one slot, and up to 300 per cent. by the use of multiple slots. Opening the slots increases the resistance of the wing appreciably at relatively fine angles, but, with mechanical arrangements to open and close the slots, it is possible to use the low resistance qualities of a normal wing for normal flight, and the low speed of landing, rapid get-off and steep climb given by the open slot on one and the same machine.

A great deal of experimental and research work has been carrried out by Handley Page, Ltd. and the Aeronautical Research Committee on both models and full-size machines fitted with slotted wings. The full size experiments confirm in flight the high lift coefficients obtained with the model.

A machine fitted with slotted wings is illustrated herewith. (*See* Fig. 2).

HANDLEY PAGE TWIN-ENGINED BOMBER

Normal Load

Weights	Napier "Lion" Lbs.	Kgs.
M/c. light, with water ..	7,980	3,615
Fuel (seven hours' cruising) ..	2,630	1,192
Crew: 4	720	326
Military load	2,300	1,042
Total load	13,630	6,175
Total useful load ..	5,650	2,560

Overload Capacity

	Lbs.	Kgs.
Fuel (11 hours' cruising) ..	4,130	1,880
Total useful load	7,150	3,250

Performance (with normal load)

	M.P.H.	Km./p.h.
Minimum speed 0 ft. ..	55	88
Maximum speed—		
0 ft.	111	177·5
5,000 ft.	111	177·5
10,000 ft.	108·5	173·6
Rate of climb—	ft./min.	m/min.
0 ft.	830	253
5,000 ft.	590	180
10,000 ft.	320	97·5
Time of climb	10,000 ft.	19 mins.
Service ceiling	14,050 ft.	4,130 m.
Absolute ceiling	16,000 ft.	4,875 m.

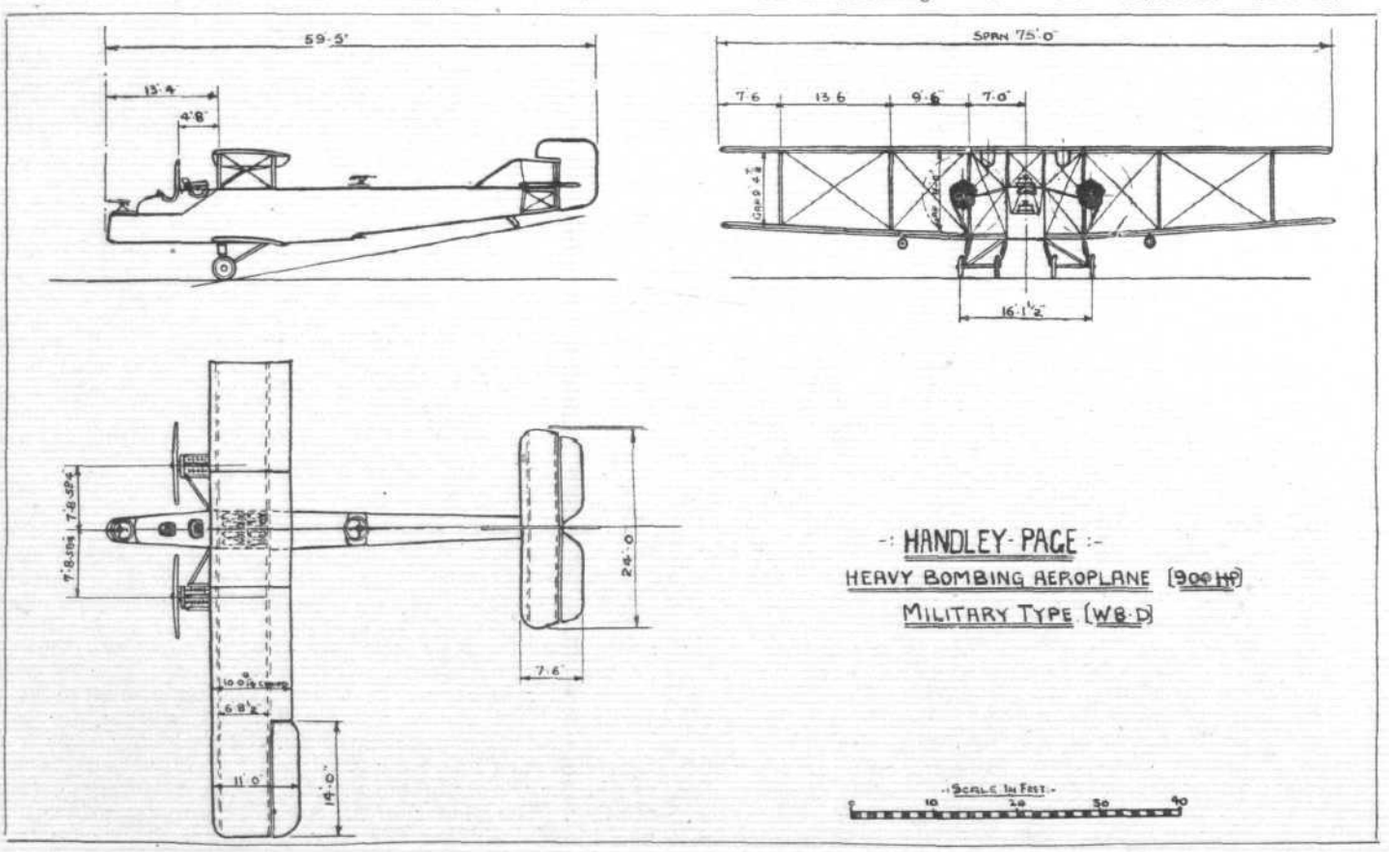


Fig. 1.

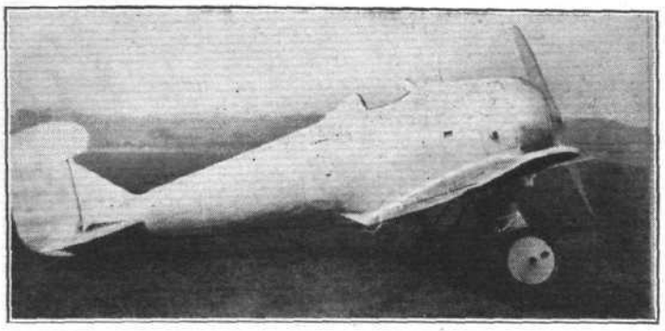


Fig. 2. Single-seater fighter with slots closed.

The wings are provided with one slot in the leading edge, formed by rocking forward on two links a small aerofoil constructed in duralumin. In the closed position this aerofoil fits snugly against the upper surface of the wing, and in this position the wing is of ordinary section. In addition, flaps are arranged all along the rear edge in such a way that when pulled down they open a second slot. These rear flaps are inter-connected with the front aerofoil, so that when the slot is opened the flaps are pulled down and thus open a second slot situated in front of the flap. By this means the angle at which the maximum lift is obtained is quite normal, the extra incidence necessary to obtain lift with the forward slot being compensated for by a decrease in angle due to the rear slot and flap.

A further development in the use of the slot is that for lateral control purposes. By the interconnection of the outer portion only of the forward aerofoil to the aileron, full lateral control can be obtained at and beyond the stalling point of the aircraft. The mechanical operation of this is shown in Fig. 3.

There are two cases to consider, one with slots closed and the other with slots open. With slots closed an upward

"HENDON" 450 H.P. NAPIER "LION"

Weights.	lbs.	lbs.	kgs.	kgs.
Machine light (with water) ..	3,968		1,798	
Fuel	686		311	
Crew (2)	360		163	
		5,014		2,272
Military useful load		1,956		886
Total load		6,970		3,158

Weight, per sq. ft. 12·4 lbs. per sq. m. 60·5 kgs.
,, per h.p. 14·81 lbs. per sq. m. 6·7 kgs.
Range at cruising speed : Approx. 3 hours.

Performance.	M.p.h.	Knots p.h.	Km.p.h.
Speed at sea level	110	98	176
Landing speed	45	40	72
Rate of climb at sea level	520 ft./mins.		159/m./mins.
Climb at 3,000 ft. ..	.. 7 mins.		
Service ceiling	.. 10,000 ft.		3,050 m.

HANDLEY PAGE SINGLE-SEATER FIGHTER.

Load Distribution.	B.R.II, 220 h.p.		"Jaguar" 385 h.p.	
	lbs.	kgs.	lbs.	kgs.
Machine light ..	1,330	602	1,720	779
Petrol	200	91	400	182
Oil	40	18	50	23
Crew	180	82	180	82
Useful military load	180	82	180	82
Total weight ..	1,930	875	2,530	1,148
Range at cruising speed	3 hours.		3 hours.	

Performance.	(*Actual*)		(*Estimated*)	
Maximum speed at ground	m.p.h. 146	k.p.h. 235	m.p.h. 178	k.p.h. 286
Landing speed ..	49	79	55	88
	ft./min.	m/min.	ft./min.	m./min.
Rate of climb.. ..	1,800	549	2,400	732
Climb at 3,000 metres	8 mins.		5 mins.	
,, 5,000 ,, ..	18 mins.		10 mins.	
Service ceiling	.. 21,000 ft.	6,405 m.	27,000 ft.	8,235m.

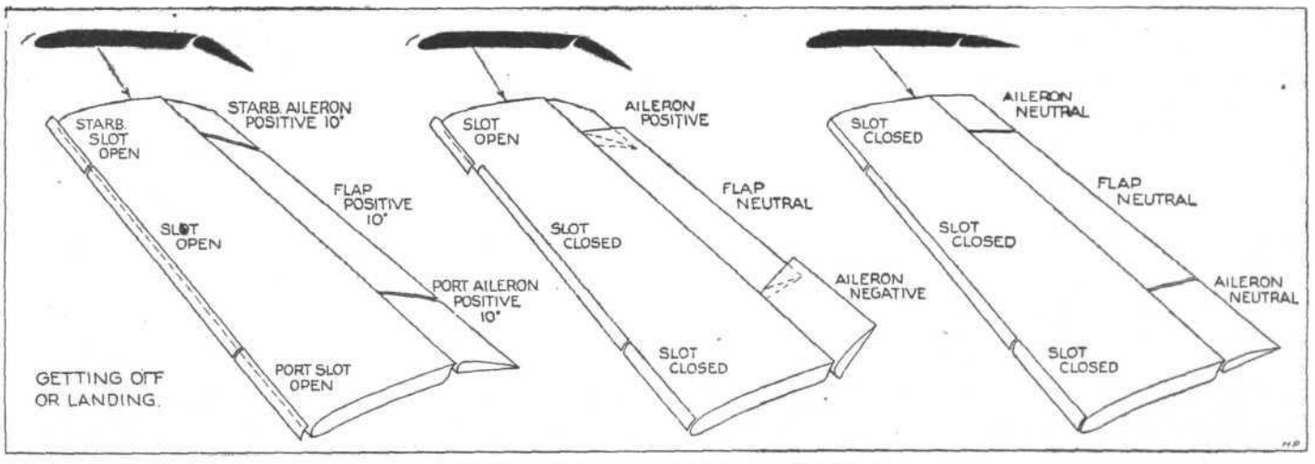


Fig. 3. Diagram of slot combinations.

movement of the aileron gives no corresponding movement of the forward aerofoil, whereas a downward movement of the aileron causes the slot to open. When the slots are open the reverse takes place, a downward movement of the aileron causes no movement of the forward aerofoil, but an upward movement of the aileron closes the forward slot.

In both cases, when the aircraft is stalled, the wing which is falling, retains its lift owing to the open slot, whereas the other wing which is rising, is caused to burble, owing to the closed slot. By this means decreased lift and increased resistance is obtained on the wing which is rising, with the result that practically no rudder is required to neutralise that difference in resistance between the two wings which is set up in the ordinary machine with ailerons operated in the normal manner.

The specifications of the two machines illustrated above are as follows :—

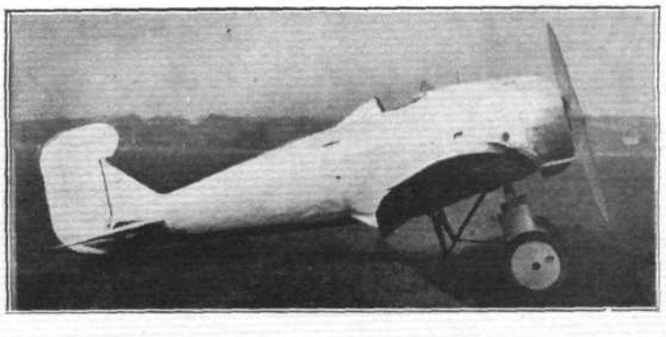


Fig. 4. Single-seater fighter with slots open.

FLIGHT
AIRCRAFT ENGINEER AND AIRSHIPS

DECEMBER 2, 1926

The GLOSTER AIRCRAFT Co., Ltd.

WHERE TO SEE BRITISH AIRCRAFT

By A VISITOR TO CHELTENHAM

IN the world's aeronautical calendar the Paris International Aero Exhibition is one of the events of the year. It is by no means as convincing or instructive an event as the British counterpart, the Royal Air Force Display at Hendon, which is a practical demonstration of what British aircraft really can do.

International Exhibitions, however, are always of particular interest. They bring together the products of different countries and thus enable useful comparisons to be made. Unfortunately, in the case of Paris foreign representatives discover that the Exhibition is international more in name than in fact, which is disappointing.

There will, no doubt, be many visitors to the Paris Exhibition who, like myself, are keenly interested in British aircraft. I am afraid the Exhibition will afford them little opportunity of indulging that interest, for unless I am greatly mistaken, British aircraft, as distinct from British engines, will be conspicuous principally by its absence. "Where to see British Aircraft" is therefore not a guide to the British Exhibit in Paris.

My disappointment in this respect is tempered by the reflection that exhibition machines are exhibition machines, and to see them freshly doped and decorated on ornate exhibition stands is to learn little about their real flying qualities and fitness. Things are not always what they seem, as we sometimes discover when we get up into the blue. The exhibition stand is, after all, little more than an introduction to the machine exhibited. To form an accurate judgment of the qualities of the machine, we must have accepted tests and, moreover, see the particular constructor's factory and methods.

To judge British aircraft, therefore, and to realise the unqualified superiority of British design and workmanship, one must cross the Channel. I am convinced that anyone visiting Great Britain and inspecting the British Aircraft Industry, can have little doubt that British aircraft forms the vanguard of aeronautical research to-day. It is in support of this conviction that I write the following impressions of one of the factories I visited, the Gloster Aircraft Company's factory at Cheltenham.

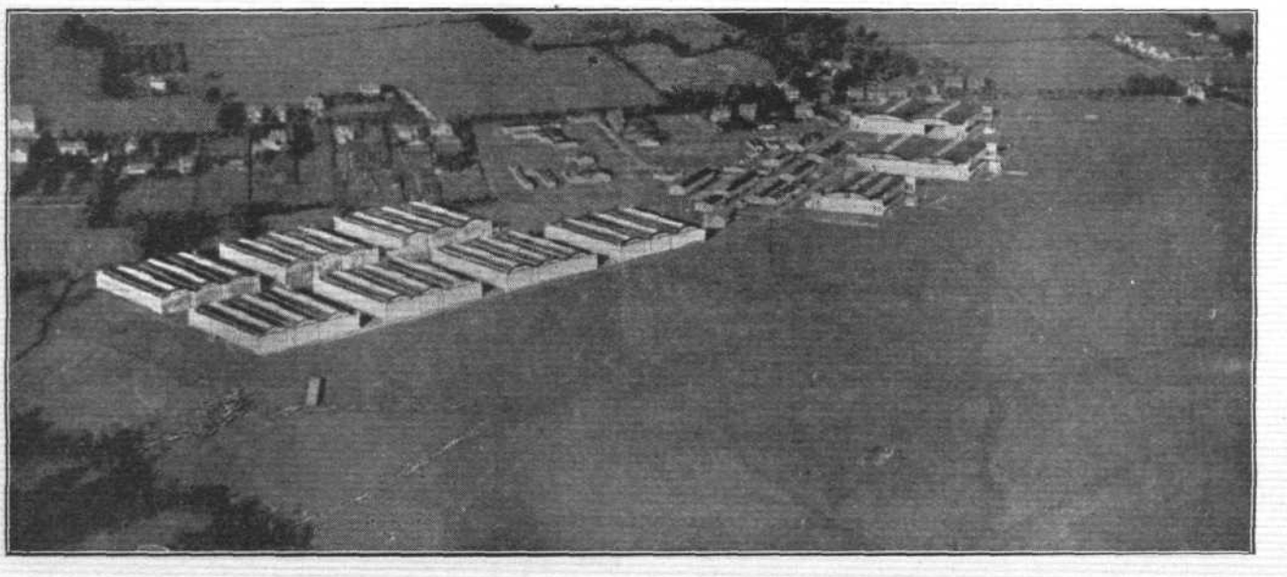
When preoccupied with arranging a programme for my stay, the name "Gloster" came irresistibly to my mind in the first place. It seemed to conjure up in my brain visions of swift birdlike forms, and graceful lines suggestive of good design and sound construction. I could scarcely go wrong if I selected "Gloster" for my first visit.

The Gloster Works are conveniently situated next to the main railway line which runs from Bristol northwards through Cheltenham to Birmingham, Manchester and the North, a branch line running into the factory itself. The buildings have obviously been designed for efficient and rapid production. I was informed that the factory turned out nearly 100 machines per month during 1917-1918, when great demands were made upon them. The efficient administration and the order and system prevailing throughout the works impressed me.

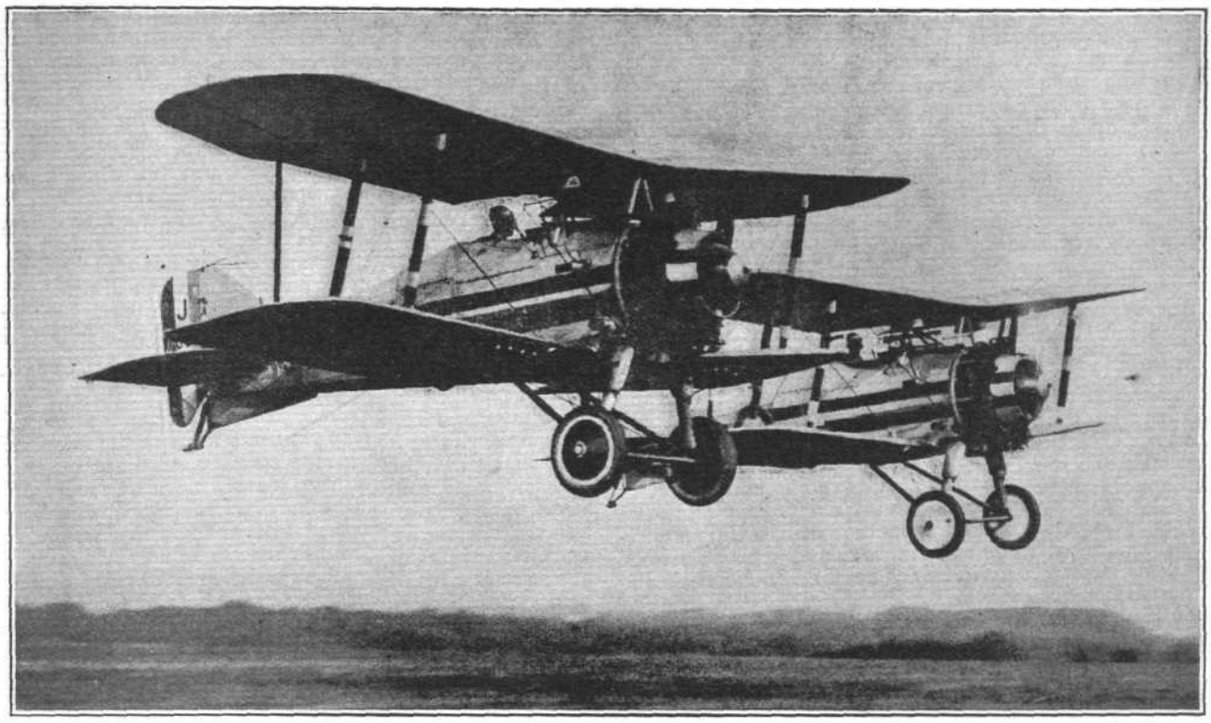
It takes a full day to get round the 12 acres of shops which comprise the factory. My tour began with the timber section, a series of extensive buildings literally humming with work. Here I was able to verify the Gloster reputation for good workmanship, which is undoubtedly of a high standard. I visited shop after shop in the whole process of aircraft manufacture; the very up-to-date woodworking mill, woodwork finishing section, propeller shop, polishing shop, all with their excellent inspection and selection organisations; then on to the foundry and the extensive sheet-metal shops. Here I watched the Gloster petrol tanks in the making. Almost all Gloster types have the petrol tanks neatly recessed into the upper wings and secured in a very simple way by four bolts only. These tanks can be taken out and replaced in the short space of less than half an hour, a considerable advantage over tank installation in the fuselage which often requires hours for replacement. The Gloster arrangement, moreover, has the additional advantage of providing a simple gravity feed to the engine, which eliminates all pump troubles.

Amongst the numerous detail parts which I examined in the engineering shops was the Gloster patent oleo undercarriage, which is one of the neatest and best on the market. Here, too, it was obvious that metal construction plays an important part in Gloster progress. This Company is concentrating its efforts as regards metal construction on the all-steel method, and most of their types are now being produced in steel as well as in wood. I had an opportunity of seeing several all-steel machines later in the erecting shops. The metal construction experimental section gave me an indication of the very thorough way in which this firm is tackling the important problem of the application of metal to aircraft construction.

In the erecting shops were, of course, the finished products —"Grebes," "Gamecocks," "Gorcocks," and others—an impressive array. I know of no other make of machines so pleasing to the eye as Gloster machines. Their graceful lines seem to me to court the air, and I have no doubt in my own mind that this has a good deal to do with their exceptional performances. To look at the "Gamecock," with its clean engine cowling, its machine guns nicely let into the sides of the fuselage, its tanks neatly recessed into the wings, after having seen in detail the excellent workmanship put into it, is to understand without difficulty how this fighting scout has won for itself a reputation as signal as that of the



Gloster private aerodrome at Brockworth.



Gloster Grebes (Jaguar engine) demonstrating at the Lympne Light 'Plane Meeting.

well-known Gloster "Grebe." Both these types are now prominent features of the Royal Air Force equipment.

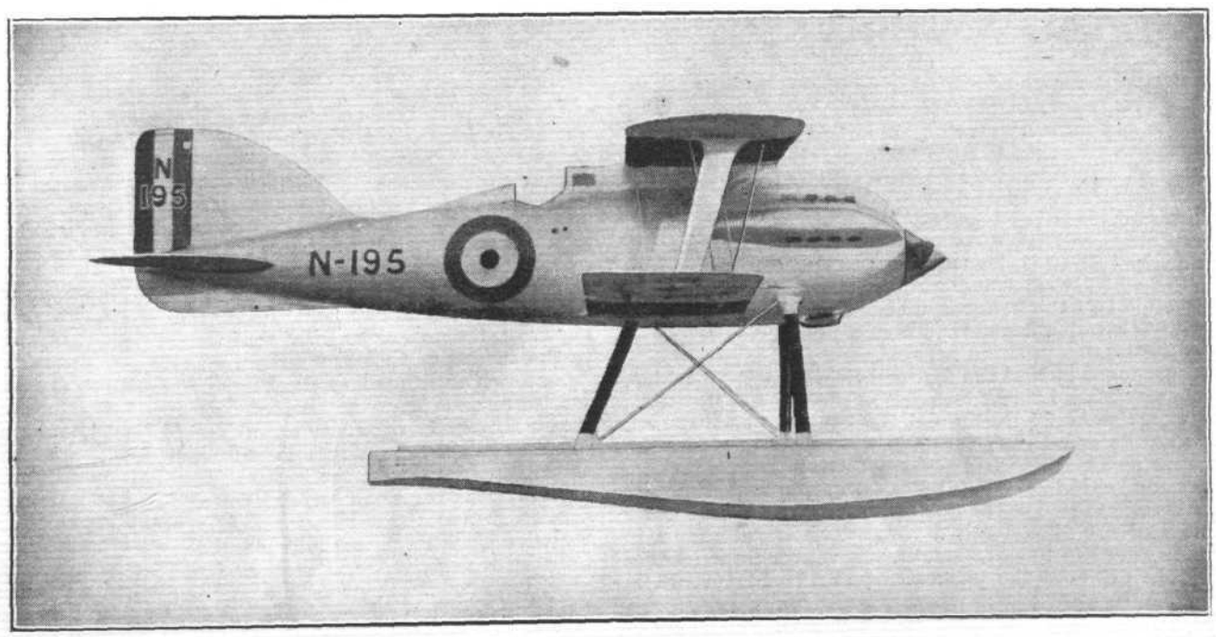
I was privileged to have a brief glance at several new types now being constructed on the company's own initiative, including single-seaters, two-seaters, bombers, and others. Foreign representatives will do well to watch the development of this firm's progressive policy.

The experimental department, of course, I was not allowed to see in spite of all my powers of persuasion. I have reason to believe that amongst the closely guarded secrets of that department is a new Schneider Cup machine which is expected to be a serious competitor in next year's race.

But the preliminary to all the activities of an aircraft firm is the designing department. Without efficient design, of course, neither organisation nor workmanship, however good, is of any avail. The Gloster Company are to be congratulated upon their very able chief engineer and designers and their competent staff, who work in a drawing office, the dimensions and equipment of which are such as few aircraft firms are fortunate enough to possess.

It was of particular interest to me here to discover to what extent the Gloster Company endeavour to meet the requirements of the foreign market. Preference for this or that type of engine, whether for climatic or other reasons, is frequently the determining factor in selecting the type of machine to be adopted. I was surprised to find that the Gloster Company, in addition to the design of the standard type with standard engine, had already prepared designs for fitting almost any possible alternative engine, British or foreign, to their machines with a view to foreign requirements.

The Gloster Company, furthermore, guarantee the specified performance of their machines to all purchasers, a practice of considerable importance to foreign missions responsible to their Governments for the recommendations they put forward. There can, therefore, be no question of fictitious



Gloster III. racing seaplane with Napier Lion engine.

performance figures ; on the contrary, I understand that the Gloster practice in specifying performance is to give a conservative estimate which is invariably exceeded.

* * * * *

Having completed my tour of the factory, I was taken to the aerodrome at Brockworth a few miles away. In the ten enormous hangars there must be sufficient accommodation for several hundreds of machines, ample room for the day when aviation comes to its own. A number of " Grebes " and " Gamecocks " were standing by awaiting their departure for Service units. Incidentally, one " Gamecock " was awaiting a flip to one of the Baltic States for demonstration purpose, while another machine was being tested before despatch to the Far East.

I witnessed a demonstration of both the " Grebe " and the " Gamecock," which made me envious of the Service equipment of the Royal Air Force.

One always associates the Gloster Company particularly with the Single-Seater Fighter, and they undoubtedly are to-day one of the principal, if not the principal constructors of this class of machine in the world. The Grebe, the Gamecock, and the Gorcock are but the latest of a series of successful Single-Seater Fighters produced by this firm. I think I am right when I say that the Gloster Company have supplied more machines of this class, of post-war design, to the British Government than any other firm. Bearing in mind the very high standard required by the British Air Ministry for Service machines this fact is an eloquent testimony to the quality of Gloster Fighters.

The Single-Seater Fighter is the most important unit of any air force equipment. Upon the superiority of this class of machine in any future war, will, I think, depend very largely the issue of the conflict, at any rate in so far as aerial warfare is concerned. Nothing could be more convincing of this than the Hendon Display of last July in which, incidentally, some 70 Gloster Fighters participated. It is to the credit of the Gloster Company that they recognised this fact from the first, and applied all their initiative and resource to the production of a highly efficient Fighting Scout. Their success in this direction is, I think, due in no small degree to high speed research work which has always been a prominent feature of their activities.

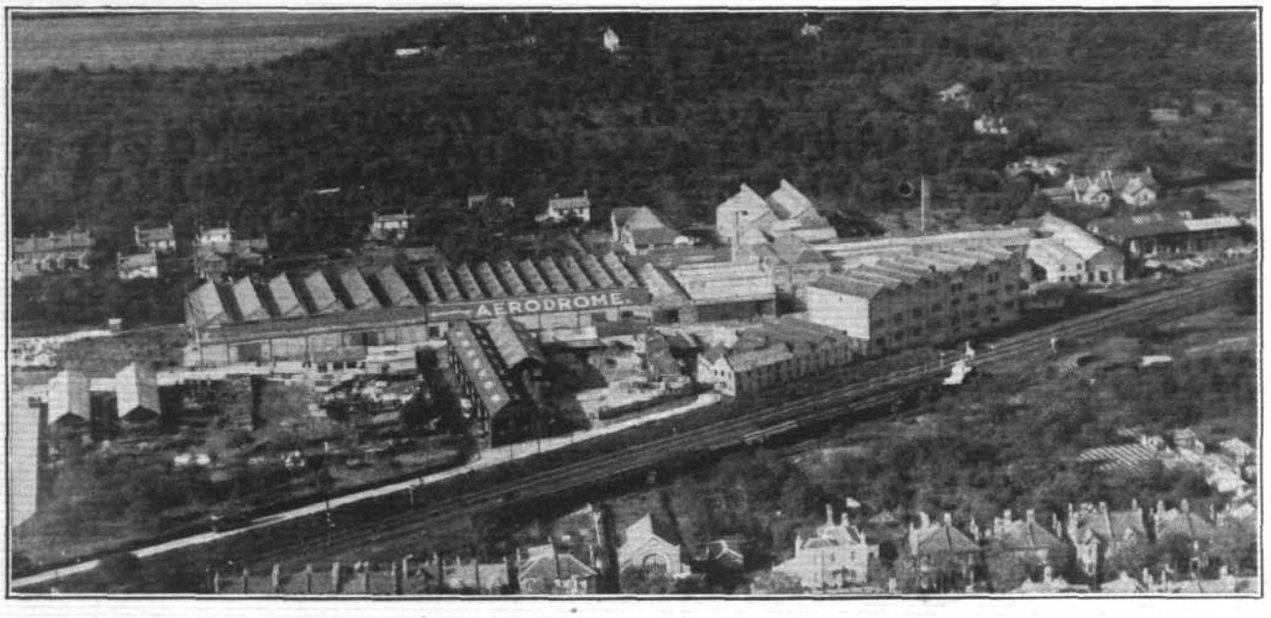
They produced in 1921 the first real British racing machine, the Gloster " Mars I " or " Bamel " as she came to be called, which won the Aerial Derby and the handicap of that year at an average speed over the 200-mile course of 163 miles per hour. This machine was actually turned out in little over six weeks and entered the race practically without preliminary tests, a striking proof of the quality of Gloster design. Later in that year the Bamel raised the British speed record to 196·6 miles per hour, and at Martlesham Heath Experimental Station she achieved the phenomenal climb of 20,000 ft. in 12½ min.

Though long since outclassed by speedier Gloster machines the Bamel is still on the active list. Erected on floats she is now being used as a practice machine for the British Schneider Cup pilots which, by the way, speaks very well for the workmanship put into it. The Gloster Bamel constituted a landmark in the development of British aviation which is borne out by the fact which I learnt at Cheltenham, that a model of the machine is shortly to be placed in the South Kensington Museum.

The Bamel was followed by the Gloster I, a development of it, which won the Aerial Derby both in 1922 and 1923. The average speeds attained were 180 and 192·4 miles per hour respectively. Over an officially timed kilometer the Gloster I raised the British speed record in 1922 to 212·2 miles per hour.

Since 1923 the British Aerial Derby has unfortunately not been run owing to lack of competition. The Gloster Company however, have, I understand, been ready with a machine each year, but with no other entrants the race has had to be abandoned.

In 1924 the company decided to enter a machine for the International Seaplane Race for the much coveted Schneider Cup and the Gloster II was built. A mishap to the machine during the trials prevented participation in the race that year A new machine, the Gloster III, was produced for the 1925. race held at Baltimore, U.S.A. She finished second with an average speed over the 200-mile course of 199·169 miles per hour. The Gloster III is therefore now the fastest British machine over a distance of 100 and 200 km. The speed attained in the race however does not represent the real capacity of the machine for several reasons. Wing radiators were to have been fitted but were unfortunately not available in time for the race. Unfavourable weather prevailed during the whole period of the trials in England which made it impossible for the machine to be properly tested out before despatch to the United States.



Gloster Aircraft Company's Works at Cheltenham.

I was fortunate at Cheltenham in being able to see the Gloster III with wing radiators fitted, and a forged propeller, and a beautiful job it is too. I gathered however, that the new machine now being built by the Gloster Company for the 1927 race will eclipse even the Gloster III.

There can be no doubt that the experience gained in the designing, constructing, and testing out of these high speed experimental machines has contributed very considerably to the success of Gloster standard types.

Few British firms have done more to establish records for British aircraft than the Gloster Company. The position of Great Britain in regard to world records is an unfortunate one, and might convey to those who have not seen for themselves, the impression that British aircraft is behind that of other countries. I can assure them from what I saw at the Gloster Works that this is not so. I am convinced that with equal organisation and support the British aircraft industry is capable of capturing any world's record to-day.

Before leaving the designing department, I was shown a model of a patent variable pitch propeller now being tested out by the Gloster Company, who have acquired the world rights of the invention. It has been designed by the well-known inventor, Dr. Hele Shaw, and is hydraulically operated.

Gloster Gambet single-seater deck fighter with Jupiter engine.

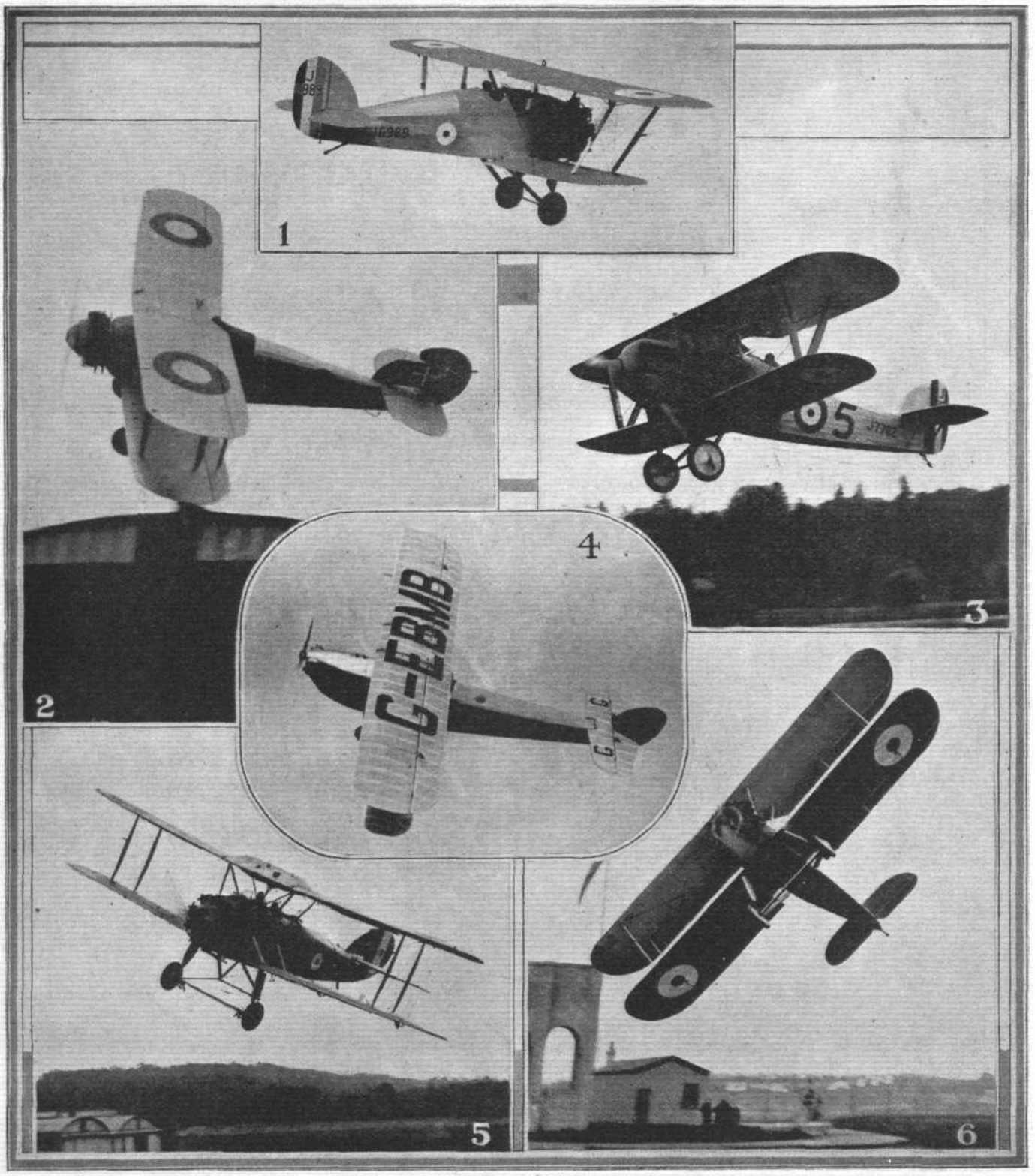
It is worked by means of a variable stroke oil pump which is reversible in action, so that oil pressure can be operated on either side of the hydraulic piston which moves the blades of the propeller in either direction. The pump operation is controlled by a governor which can be set so that automatically the pitch of the blade is maintained to give constant revolutions of the engine. A separate hand control can be provided to vary any predetermined setting of the governor. The invention is very ingenious and important and its development by the Gloster Company is worth watching.

I returned from Cheltenham after a very full but highly instructive day. The Gloster Company are a progressive firm, abreast of future aviation development in all its branches, and determined that their products both in design and construction, shall remain of that high standard which has won for them the great reputation which is theirs to-day.

My visit left me with a wholesome respect for British aircraft in general, and Gloster aircraft in particular.

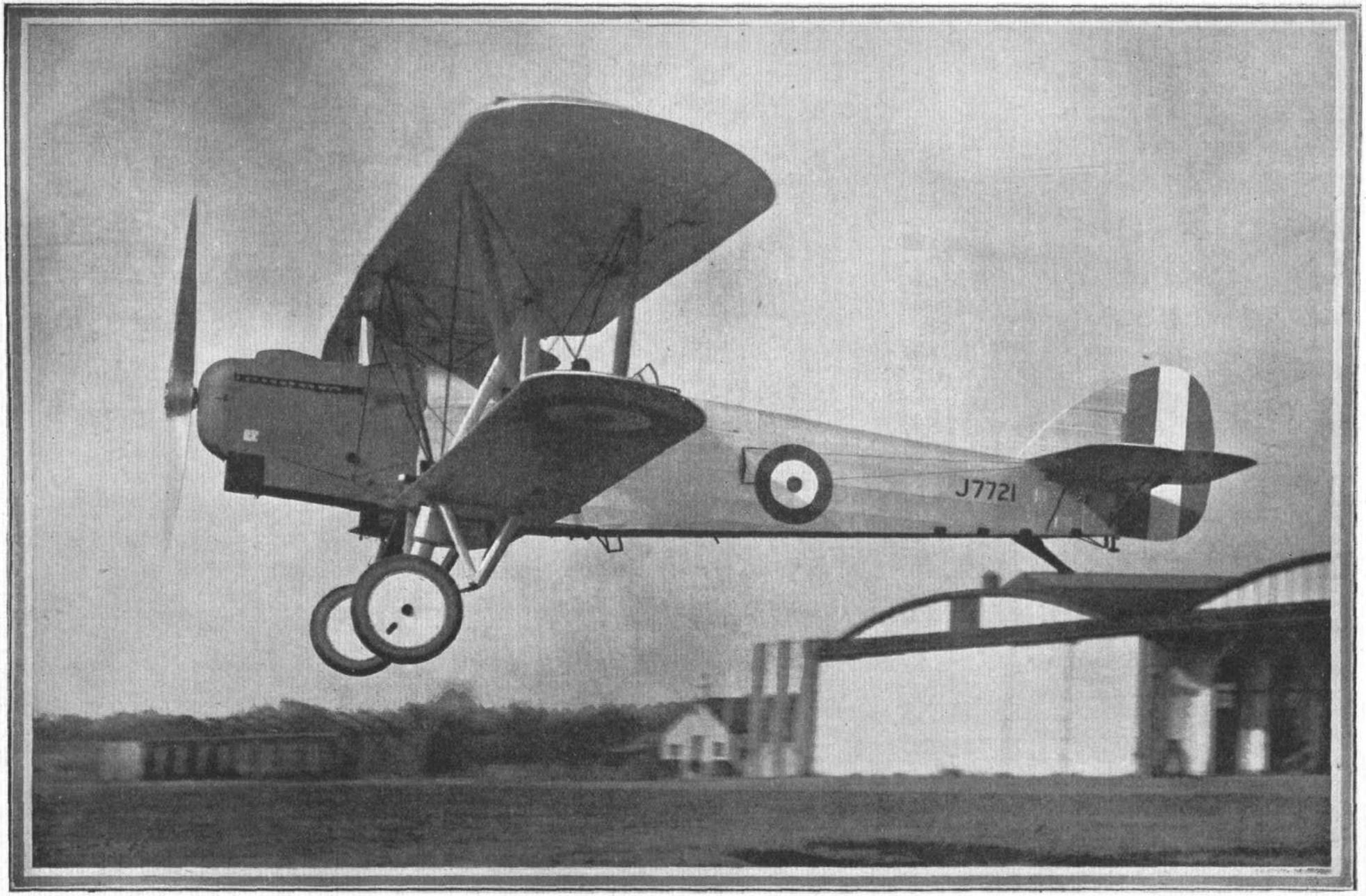
Gloster Gorcock single-seater fighter with Napier Lion engine.

The H.G. HAWKER ENGINEERING Co., Ltd.



["FLIGHT" *Photographs*

(1) The Hawker "Heron" with Jupiter Engine is a metal fighter embodying some novel and advanced constructional features. (2) The Hawker "Danecock," with Jaguar engine, is a single-seater fighter, supplied to the Royal Danish Naval Air Service, and now under construction in Copenhagen. (3) The Hawker "Hornbill," probably the most formidable "pursuit ship" yet constructed, is fitted with a Rolls-Royce Condor engine. At present the machine is undergoing secret trials. (4) The Hawker "Cygnet" is a two-seater "light" aeroplane in the actual sense, the structure weight being only 300 lbs. Fitted with Bristol Cherub engine, this machine won the "Daily Mail" Competition this year, and a sister machine obtained second place. (5) The Hawker "Hedgehog" is a three-seater fleet reconnaissance machine with Jupiter engine and carries a big useful load. (6) The Hawker "Woodcock" with Jupiter engine, the standard night fighter of the Royal Air Force.



["FLIGHT" *Photograph*

The Hawker "Horsley," now the Standard Day-Bomber of the Royal Air Force, is an aeroplane of outstanding merit. It was officially selected after competitive trials with other machines and has a remarkable all-round performance record. This illustration depicts the machine being tested by Flight Lieut. P. W. S. Bulman, at Brooklands.

A.V. ROE & Co., Ltd.

AVRO TRAINING MACHINES

A. V. ROE & Co., Ltd., can justly claim to be experts in the matter of training. Ever since Colonel Smith-Barry demonstrated so conclusively with the Avro 504.J that not only was the Avro a wonderful training machine, but that it was possible to train pupils to such a degree of proficiency that they could immediately transfer to fast single seaters without intermediate training on "step-up" types, the Avro has been acknowledged to be the ideal military training machine.

Perhaps no one type of aeroplane has been fitted with so many different engines as the Avro, but all the experience gained in this way has led to one conclusion—if the qualities essential for military training are to be retained, only radial or rotary engines are useful. The requirements for a training machine are somewhat peculiar. If a pilot competent to fly fast scouts is to be produced, he must be trained on a machine which has the flying characteristics of a fast scout. Experience with the Avro has shown that only rotary or radial engines permit the close approximation of the centres of gravity and pressure which alone can produce many of these essential qualities. Both of the latest Avro training machines are therefore fitted with engines of these types. The "Gosport" (how apt is the name!) is intended for military training, and is fitted with the new Monosoupape engine, and the 504.N with the Armstrong Siddeley "Lynx" is for naval training and can be converted easily to take a twin float undercarriage.

The "Gosport" is still at first sight the old familiar Avro but at closer quarters a number of modifications are visible. Perhaps the most important from a school flying point of view is the redesign of the centre section plane. The area has been reduced by cutting back the leading and trailing edges as far as the main spars, and the top main planes have been tapered at the root section. As a result both the Instructor and the pupil have a greatly improved view forward and overhead. The ailerons also have been altered. By a skilful redesign of the contour the "feel" of the lateral controls now corresponds perfectly with the elevators and rudder. Moreover, in a turn, there is appreciably less drag on the outside aileron than was the case with the old pattern. The tail skid has been connected with the rudder controls so that the machine can be handled on the ground more easily.

Apart from these visible alterations, however, the machine has been very considerably lightened, but so carefully that, although the weight has been reduced by about a hundredweight, it is still as strong as a training machine should be.

The "Gosport" is even more easily manoeuvrable than the old 504.K—no doubt a sweeping statement to make, but true. Actual performance figures are not of great importance in training, but the following will be of interest: top speed, 87½ m.p.h.; minimum speed, 35 m.p.h.; Climb, 670 ft. per min.; Range, 2 hours.

For naval training the seaplane version is type 504.O, and can be converted to a landplane (type 504.N).

The modified centre section plane and ailerons as described above are fitted, and in addition, tail trimming gear, so that the incidence of the tail planes can be adjusted during flight. A feature of the sea undercarriage is the great strength of the floats, which are boat-built of a double mahogany skin on elm frames. The floats are of the single step type with vee-bottoms. No tail float is used. The land machine has a special oleo undercarriage.

This interchangeability from seaplane to land plane is a most important factor in naval training, and it can only be achieved by using an engine of relatively high power. Not only has the seaplane a good power reserve, but it is admirably suited for high altitude work, while the reserve of power on the landplane is such that the machine can be flown quite satisfactorily on one-third throttle.

The following are the performance figures:—

	Seaplane.	Landplane.
Top speed	92 m.p.h.	95 m.p.h.
Minimum speed ..	42 m.p.h.	40 m.p.h.
Climb	600 ft./min.	850 ft./min.
Range	3 hours	3 hours.

AVRO "AVIAN."

The Avro "Avian" is, above all, an efficient aeroplane. A feature which contributed towards the very considerable interest displayed in the "Avian" at the Light Aeroplane Competition at Lympne in 1926 was the extraordinarily large useful load which could be carried, and the remarkably high speed which could be attained while carrying this load.

It is essentially as a private owner's machine that the "Avian" has been standardised for production. Numerous modifications have been made in the design of the original competition machine which would not have been possible but for the fundamental excellence of the initial design, permitting the alteration of wing areas and the incorporation of numerous improvements to enhance the comfort and accessibility of the machine generally. Simplicity of design (so that an owner can maintain his machine and keep it airworthy without possessing a great deal of skill or technical knowledge), accessibility of the power unit and all working parts, robustness of construction, reliability and comfort are the first requirements for the private owner's aeroplane. All these points have been foremost in the designer's mind. Add to all these the high speed, the long range and the large luggage capacity, all better than in any other light aeroplane, and the "Avian" is, without question, the only aeroplane for the airman who flies for his own pleasure.

The choice of two engines is offered. The Armstrong Siddeley "Genet," as fitted to the competition machine, but with dual ignition, or the A.D.C. "Cirrus" Mark II, also with dual ignition. In both cases the method of installation permits easy access for examination and adjustments. The petrol system is direct gravity. The oil tank for the "Genet" engine is fitted to the side of the fuselage, where it forms part of the fairing. The oil for the "Cirrus" is contained in the engine sump. A fireproof bulkhead separates the power unit from the front cockpit.

Complete dual controls are fitted. The control column in the front cockpit can be removed, and the rudder bar can be disconnected and used as footrest for the passenger. Both cockpits are roomy and comfortable for long flights. The occupants are well protected from the wind.

The "Avian" is easy to fly. It has a good degree of positive stability. It is economical. It is safe. It is efficient.

This machine will shortly be marketed at a very attractive figure.

AVRO "BISON" Gunnery Spotting and Fleet Reconnaissance Aircraft.

This aeroplane has been expressly designed for fleet co-operation, particularly in regard to gunnery spotting and reconnaissance generally. A particular feature of its design is that it can be landed on the deck of an aircraft carrier,

The Avro "Avian"

and it is, in fact, one of the safest aeroplanes for deck landing which have yet been constructed.

The pilot is seated below the leading edge of the top main plane and from this position he has an excellent view for landing. Behind him is the top rear cabin with large windows on each side to facilitate observation. Behind this cabin on a raised platform is the gunner's position from which he may communicate directly with the cabin. In order that observation may be carried out in close co-operation with the pilot, a sliding hatch is arranged in the roof of the cabin just behind the pilot's cockpit.

General construction.—The fuselage is of all-steel construction, the cabin portion being covered with three-ply wood and the remainder with linen doped in the usual manner.

The engine mounting is a separate unit, and it is possible to remove it completely from the machine with the engine, when the mounting can serve as a bench on which to stand the engine on the floor of a workshop. The pilot's cockpit is an entirely separate unit, and is mounted directly on the top forward longerons of the fuselage.

The main planes are built up on spruce spars with Warren girder ribs and tubular steel drag struts. They are arranged to fold in order to minimise housing space on the deck of an aircraft carrier. The interplane struts are of tubular steel with wooden fairings. The main planes are of a special high-lift section, and this feature combined with the remarkably powerful and accurate controls, produces in a marked degree the qualities necessary for deck landing.

The undercarriage is of the Oleo and compression rubber type, specially developed to withstand the heavy shocks which are inseparable from deck landing. The rear portion of the fuselage contains flotation bags, and an emergency signalling apparatus is carried in a suitable locker in the tail plane.

Top speed, 108 m.p.h.; range, 4 hours; ceiling, 14,400 feet.

AVRO "ALDERSHOT" Single-engined Bomber.

The Avro type 549 has been expressly designed for long-distance bombing. Its exceptional stability makes it particularly suitable for night operations, and it has, in fact, been extensively used in England for night flying with very good results.

The fuselage is large and affords ample space not only for the stowage of military equipment, but permits the careful arrangement of the bombing position. It has also been possible to arrange for very complete defensive armament in order to minimise the necessity for a fighting escort.

In view of its large size, the fuselage is built in sections, in order to facilitate transport and repair. All the crew are situated behind the main planes and their positions are such that parachutes may be readily used.

The fuselage is built with a double deck, the lower deck forming the bombing position and the wireless and navigation cabin, while the upper deck accommodates the pilot and navigator at the forward end and the rear gunner at the after end. All members of the crew can move freely about from one deck to another.

General construction.—The fuselage is of all-steel construction. The nose and engine mounting are covered with quickly detachable metal cowling, the cabin with three-ply wood and the tail portion with linen, doped in the usual manner.

The main planes are built on spruce spars with Warren girder ribs and steel drag struts. The outer planes are arranged to fold. Interplane struts are of steel tubes with wooden fairings. If desired, all-metal wings can be supplied. The wing fittings, however, are of special design, so that in case of shrinkage of the wooden spars in a hot climate, they can be easily tightened up.

The tail plane is mounted well above the fuselage in order to obstruct the rear gunner's view as little as possible. Complete tail controls are fitted and the tail plane incidence can be adjusted during flight.

The aileron control is operated on the differential principle which minimises any tendency to yaw.

The rudder and elevators are balanced and are light and powerful in action.

All these factors combine to produce the large degree of stability which is necessary for precision bombing.

Top speed, 110 m.p.h.; range, 6 hours; ceiling 14,000 feet.

AVRO "ANDOVER" Ambulance, Troop Carrier or Freight Machine.

The Avro "Andover" may be equipped alternatively as an Ambulance, as a freight-carrier or for passenger transport.

The cabin is of large dimensions (6·69 metres long and 1·42 metres wide with 1·8 metres clear head room). In addition, a baggage compartment and a lavatory are provided at the rear end of the cabin. It is possible to arrange the cabin to accommodate twelve passengers, or, if desired, fewer passengers and a corresponding load of freight can be carried. Large windows along each side of the cabin allow a good view for the passengers, and the door, owing to the method adopted for the construction of the fuselage, can be made in a variety of sizes and shapes to suit the particular purpose of the machine.

In flight, the "Andover" is stable and steady, and is light and easy to handle on all controls, so that the pilot does not become unduly fatigued during long flights.

The pilot's cockpit is situated just below the leading edge of the top centre section plane, and he has an excellent view in all directions, particularly for landing. The navigator's station is alongside the pilot's seat, but at a lower level, with direct access to the main cabin by means of a door in the sound-proof bulkhead which separates the cabin from the nose of the fuselage.

General construction.—The forward end of the fuselage is of wood, and consists of a spruce frame, covered with a skin of three ply wood glued and rivetted on. This is covered with linen and doped. The rear portion is of tubular steel construction, faired to a good streamline shape and covered with linen and doped.

The engine mounting is bolted to the front of the fuselage and the engine is isolated from the pilot's cockpit by a fire-proof bulkhead. Efficient engine silencers are fitted, and these, combined with the sound-proof construction of the cabin, make it possible for the passengers to converse without difficulty.

The main planes are of mixed wood and metal construction, and a special feature is the method of attachment of the tubular steel drag struts to the wooden main spars. The attachment fitting is so made that it can be tightened up in the event of shrinkage of the spars in a tropical climate. The planes are arranged to fold in order to economise housing space. All covering is of linen, doped.

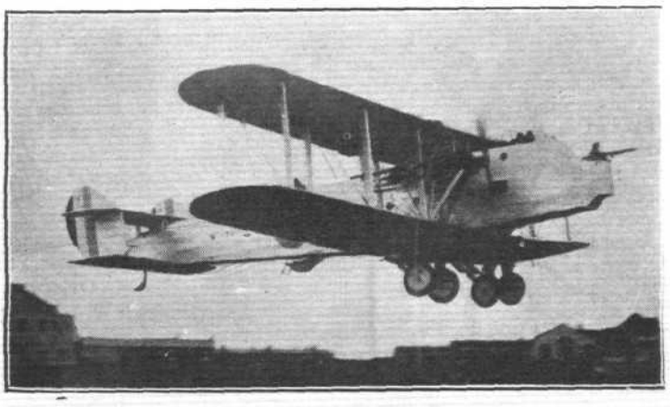
The petrol system is entirely gravity. The petrol tanks are two in number and are carried one under each top main plane.

The undercarriage is of a specially developed Oleo type, incorporating rubber in compression. This type of alighting gear has been proved to be most efficient, and heavy landings can be made without inconvenience to the passengers. The tail skid is sprung by means of rubber in compression.

Top speed, 110 m.p.h.; range, 6 hours; ceiling 13,500 feet.

AVRO "AVA" and "AVENGER."

Two Avro machines about which little can be said at the moment are the "Ava" and the "Avenger." The former is a multi-seater twin-engined night bomber and coastal torpedo defence landplane fitted with two 670 h.p. Rolls-Royce Condor III engines. The latter is a single-seater fighting scout fitted with a direct drive 525 h.p. Napier "Lion" VIII engine. This machine has a remarkable turn of speed.



The Avro "Ava"

The Avro "Avenger"

SHORT BROTHERS Ltd.

SHORT BROTHERS' wide experience in the construction of rigid airships made them familiar with aluminium alloys, and when it became apparent that something more durable than wood and fabric was required in modern aircraft, they saw that by using duralumin in the construction of aircraft it would be possible to build complete machines lighter and stronger, and definitely more durable, than the present type.

The results have been extremely satisfactory and show that for equal weight a higher factor of safety can be obtained with duralumin than with a wooden structure.

The advantages of using non-inflammable material is apparent, and the known deficiencies of wood and fabric aeroplanes, such as distortion and deterioration due to climatic conditions, are obviated.

The construction generally lends itself to rapid production, as all the parts which comprise the making of a complete machine can be stamped out of sheet material.

Short all-metal aircraft are completely built of duralumin, including the wing spars, with the exception of minor parts in which it is found that steel is a more suitable material.

In the early days of their experience with light alloy aircraft, there arose a great deal of opposition from various sources on the account that the metal used, Duralumin, was not sufficiently stable for use in the stressed parts of aircraft, and considerable doubt was expressed as to the suitability of this metal on account of corrosion. After five years of intensive construction it has been found that by proper application this metal can be safely used in nearly all the parts of aircraft, and that corrosion is not dangerous to the structure if ordinary care and maintenance is given.

The first machine built by the firm was a single-seater, single-engine, tractor-biplane, and was designed to carry mails or light freights to the amount of 400 lb. If desired, space could be arranged to take two passengers instead of mails.

The machine proved a great success, not only as regards the method of construction, but also as regards its performance, and definitely showed that the advantage in weight saving by the use of duralumin was substantial.

It was thought that the vibration caused by the engine would cause crystallisation of the metal used, and fracture of rivets, and very exhaustive tests were carried out at the Royal Aircraft Establishment in order to obtain information on these questions. The machine was subjected to vibration tests of high and low frequency for the duration of several hundred hours, without any damage whatsoever to the structure.

Continuing with the development of all-metal machines, Short Brothers produced the first all-metal boat made in this country.

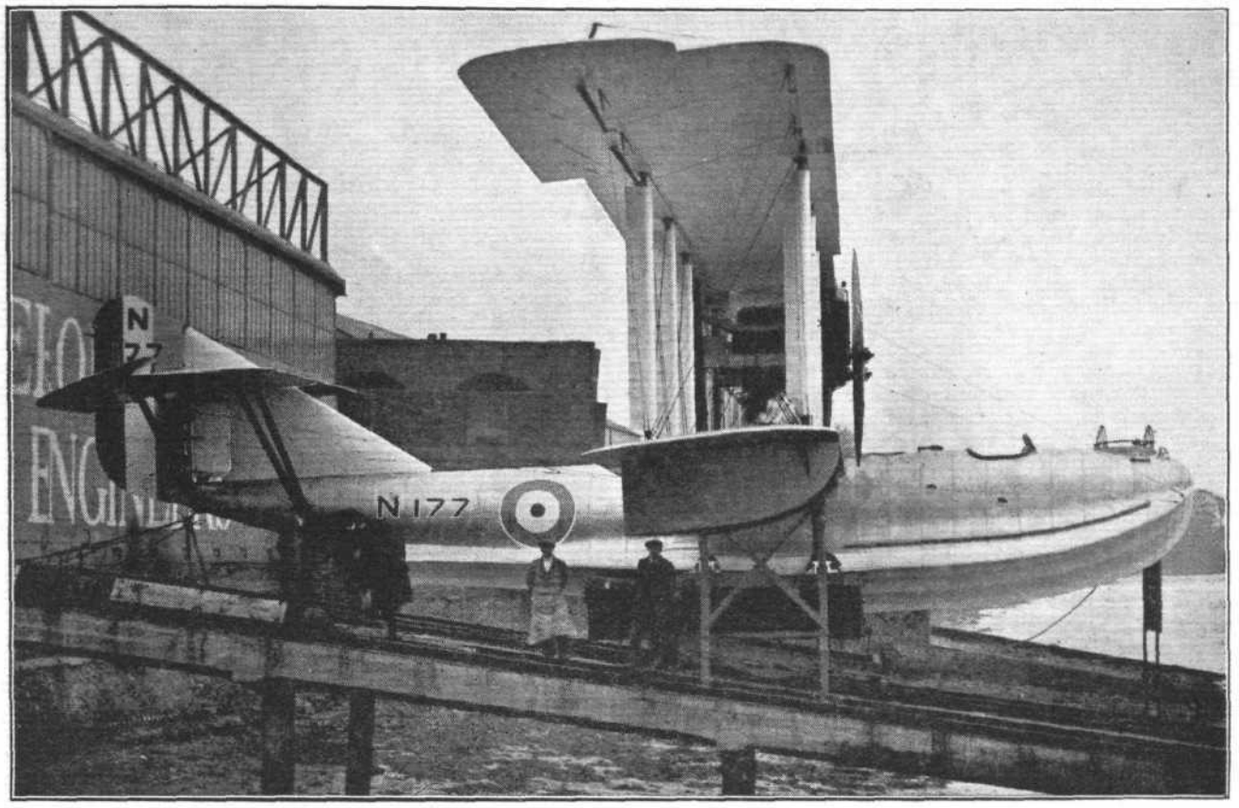
This was a single-seater monoplane flying-boat, and was fitted with twin engines of 16 h.p. each ; the engines used were standard Blackburn motor bicycle engines, and the machine gave an excellent performance and was satisfactory in every respect. This machine was subsequently purchased by the Air Ministry, and was fitted with two Bristol "Cherub" engines in lieu of the Blackburn engines, in order to increase the performance.

The small flying-boat "Cockle" referred to above.

The Air Ministry has been watching the firm's experiments in all-metal construction very closely, and an order was placed for an F.5 metal hull to be fitted to the existing main wing structure. The order was completed, and the machine was delivered to the Air Ministry and has been in continual service for over two years. Various tests were carried out in order to determine its durability when left on open water, and in exposed places. As the result of the successful results given, a further order was placed for a large flying-boat. This machine has since been delivered and is now undergoing tests, and initial reports are extremely satisfactory.

It is regretted that service regulations prevent more details being given of this and other machines under construction for the Air Ministry, and which show, in actual practice, the tremendous advantages of metal over wooden construction.

The firm has also been entrusted with an order by Imperial

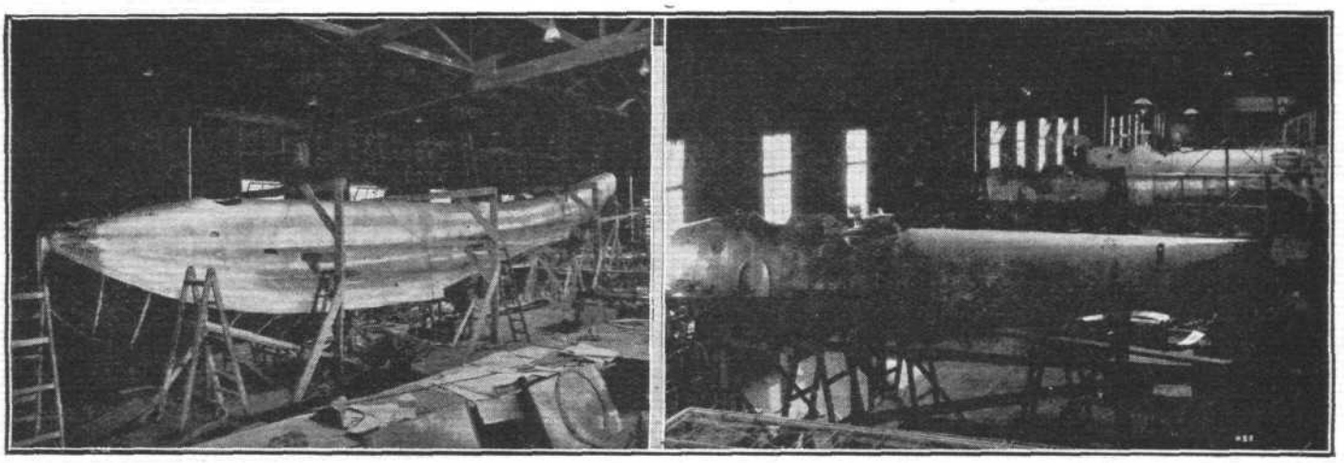


A Short F5 fitted with an all-metal hull, as described above.

Airways for two three-engined flying boats to carry approximately 20 passengers. These machines have a range of 680 miles, and will have a cruising speed of 100 miles per hour. When completed the machines will be put in service on a section of the England to India route.

satisfactory, and with a total weight of 1,430 lb. has a top speed, at sea level, of 84 miles per hour. The rate of climb is 360 ft. per minute, and it has an endurance, at cruising speed, of four hours.

The illustrations show an F.5, fitted with an all-metal hull



On left, a large all-metal hull under construction at Short Bros. Rochester Works, and on right, a series of all-metal fighting machines.

Another interesting machine constructed by the firm is the " Mussel " seaplane. This machine is a two-seater semi-cantilever monoplane. and is fitted with a 60 h.p. " Cirrus " engine. Its performance as a seaplane is extremely

as described above ; a large all-metal hull now under construction at the firm's Rochester Works, and a series of all-metal fighting machines. The small flying boat shown is the " Cockle " referred to above.

GEORGE PARNALL & Co.

UNDER the direction of Mr. George G. Parnall, acting as General Manager of their Aircraft Department, Parnall & Sons, of Bristol, acquired an excellent reputation during the war for the machines supplied to the Air Board and Admiralty. Mr. Harold Bolas, M.B.E., B.Sc., A.M.I.C.E., A.F.R.AeS., of the Admiralty, Air Department, was released as a designer, and produced the Panther Ship Aeroplane, of which a large number were ordered. Mr. Parnall also was responsible for the supply of a large number of Avro machines, Hamble Baby Seaplanes and Short Bombing machines, etc.

After the Armistice, the firm abandoned Aircraft Manufacture, and Mr. Parnall started business as George Parnall & Co., retaining the services of a considerable number of the original personnel, Mr. Bolas continuing to act as Chief Designer. Mr. Parnall is to be congratulated upon his courage and enterprise in initiating such a business at that time, and upon the success with which his efforts have so far been attended.

George Parnall & Co., although designing all types of aircraft, have realised the insular position of Great Britain, and the outlying portions of the Empire, and have devoted special interest to the production of aircraft, which can be operated from a ship's deck, and also to amphibians of pure seaplanes and flying boats.

The Parnall Panther.—This machine was designed by Mr. Bolas during the war, and was a ship's aeroplane, with hydrovanes and flotation bags for emergency landings on the water. Next came the Parnall "Puffin"—a central-float seaplane amphibian possessing a number of curious features. This machine had wing tip floats to assist the central float in rough seas and high winds, and it was also provided with an inverted tail unit—that is, fin and rudder were placed underneath the tail plane and elevators to give a clear field of view aft. The rear portion of the central float was hinged, and acted as a skid when the machine was on land.

The Parnall Possum was an experimental triplane intended to examine the merits of central engine units, with gear drives to airscrews on the wings. In a final and ambitious form the system would embrace a large central engine room containing the whole of the power plant, with engineers in charge who would attend to the motors and even perform repairs in the air in case of breakdown of any one power unit, the machine flying in the meantime upon its remaining units.

The Possum has a gear drive of the simplest type, embracing a single Lion engine in the fuselage driving the airscrews on the wings through bevel boxes and wing-shafts. Clutches, with their weight and liability to trouble, were eliminated. Although the method of mounting the engine and airscrews involves more weight than is found in normal methods, the arrangement has distinct advantages.

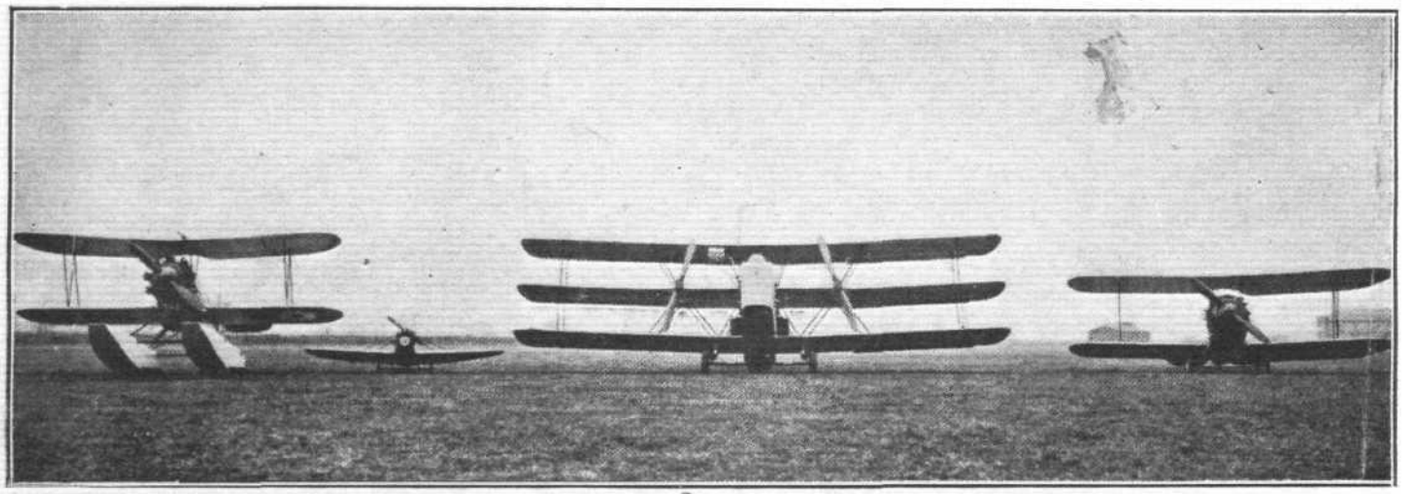
The machine was fitted with parachutes, and had a steerable tail wheel, which could be braked for landing on small aerodromes. The fuselage had accommodation for a crew of three, and a compartment for mails.

The Parnall Plover is a single-seater ship's fighter, designed for use from the turret of a ship, or from the deck of an aircraft carrier. It can, however, be used with either a normal wheeled undercarriage or with twin floats. In the latter case, wheels are carried within the floats so that the machine is amphibian. Either Jaguar or Jupiter radial air-cooled engines can be fitted. One of these machines flew in the King's Cup Race of this year, and was piloted by Squadron Leader Sir Christopher J. Brand, one of the first airmen to fly to South Africa from the Motherland.

The amphibian conversion is an imposing looking machine. It is fitted with a separate gas starter engine so that it may be operated without difficulty on the open sea.

For the 1923 and 1924 Lympne Competitions the firm produced the single-seater and two-seater Pixie Aircraft. The former was a monoplane, and was the fastest and lightest light aeroplane in the world—and fitted with a Douglas motor-cycle engine it won the Abdulla speed prize against all comers, at Hendon. The two-seater Pixie was convertible from monoplane to biplane, and was constructed with dual control, so as to be used as a training machine. Fitted with a Cherub III engine, this machine was again successful in the Lympne competitions of 1926.

All the machines were designed by Mr. Bolas and his staff, who are at present engaged on a number of very interesting aircraft, including an Auto-gyro for the British Air Ministry, and a machine of similar type for the Cierva Autogiro Co., Ltd.



Parnall Types—From left to right : The Plover seaplane, Pixie, Possum triplane, and Plover ship fighter.

Amongst other machines on order by the Air Ministry is a training seaplane, the Parnall Perch. This machine is somewhat unusual, owing to the fact that the pilot-instructor and the pupil are placed side by side in the fuselage and use the same instruments. It is provided with a land undercarriage, so that tests may be carried out on inland aerodromes when necessary.

George Parnall & Co. are using an increasing amount of metal work in the construction of their machines, and it is interesting to note that they built steel tubular fuselages as far back as 1920.

A short while ago Mr. Parnall purchased from the Disposal Board the buildings and aerodrome situated at Yate, near Bristol, covering an area of about 150 acres. The buildings alone afford approximately 300,000 ft. of manufacturing space, apart from the Bristol factories, and the well-deserved expansion of the business is fully provided for. George Parnall & Co. may justly look forward to the support of the Air Ministry and that of the British Dominions.

Their head offices are The Bristol Coliseum Works, Park Row, Bristol, and their factories at Park Row, Nirvart Street, Quakers Friars, Bristol; the flying sheds and works are at Yate aerodrome, Gloucestershire, and in London they are at Evelyn House, 62, Oxford Street, W.1. Cables to Warplanes Bristol.

The SUPERMARINE AVIATION WORKS Ltd.

THE firm was founded in 1912 at Woolston. Several experimental high-speed hydroplanes were built, which were followed by a flying-boat hull of circular construction on which was erected a wing superstructure with central engine mounting, which was one of the first flying boats actually produced in this country. The following year was occupied chiefly with experimental work, and the improvements in design of sea-going aircraft. Following on the outbreak of war, the Government took advantage of the location of the works to repair and to recondition at Southampton damaged machines which had been returned from the Front by the R.F.C.

Subsequently the works were considerably increased, and the firm became controlled by the Government. Practically all the experimental and design work was carried out for the R.N.A.S., in addition to production orders for school flying-boats and fighting seaplanes.

In 1919 the first flying-boat Channel Service was opened with Supermarine "Channel" type passenger machines. This was extended to France during the Autumn of that year, and a large number of passengers were conveyed between England and the Continent. In September of that year the firm entered a flying-boat for the International Schneider Cup race at Bournemouth. The result of the activities of the firm during this year fully proved the possibilities of the design of the machines which they had constructed.

In 1920 Supermarine Channel type flying-boats were exported to Norway to the order of the Royal Norwegian Naval Air Service; also to a private Norwegian Company who established and ran a mail route with Supermarine machines with great success. In July the firm at the Olympia Aero Exhibition showed a modified and improved Channel type flying-boat, together with the Supermarine "Sea King" single-seater flying-boat. In September the company produced the first Commercial Amphibian flying-boat, and this was entered in the Air Ministry competition at Martlesham and Felixstowe, where it was awarded a prize of £8,000 on account of its remarkable reliability, durability of construction and excellence of design and seaworthiness.

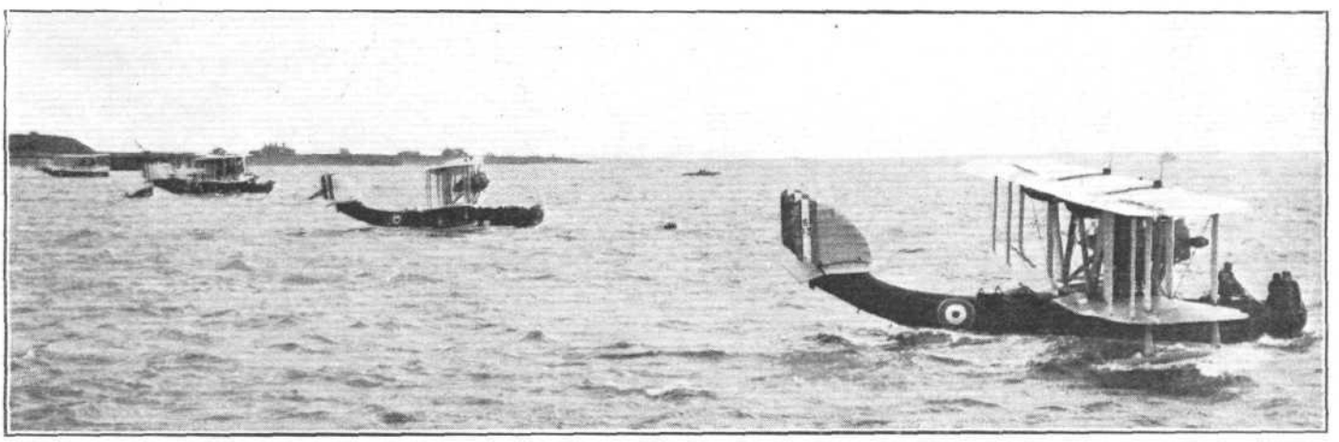
In 1921 the Design department produced the first specially-designed Deck-landing flying-boat which was the forerunner of the firm's well-known "Seagull" type of machine. Flying-boats of this type, and also of the Channel type Training and School machines were exported to Japan, New Zealand, Fiji Islands, Trinidad, British Guiana, Chile and Sweden.

In 1922 the "Seagull" type of flying-boat was ordered in large numbers by the British Air Ministry. In July a single-seater machine known as the "Sea Lion" was sent to Italy to compete for the Schneider Cup, and was successful at Naples in regaining this Trophy for England, being piloted by Capt. H. C. Biard.

In 1923 still further "Seagull" type machines were ordered by the Air Ministry for co-operation with Naval aircraft carriers. About the middle of the year a new type of commercial amphibian flying-boat was produced, known as the "Sea Eagle." This was entered in the King's Cup Race, and as such was the only flying-boat amphibian to take part in the competition. This type of machine was used to open the first regular flying-boat service run by the British Marine Air Navigation Co., Ltd., to the Channel Islands and France. In September the "Sea Lion," the winner of the 1922 Schneider Cup, was again entered for the race held at Cowes. No outside help or support had been forthcoming for a new racer, and in finishing third behind the American competitors a really meritorious performance was accomplished.

In November Mr. Hubert Scott-Paine entirely severed his connection with the firm in order to devote himself exclusively to the development of aerial transport in connection with the British Marine Air Navigation Co., Ltd., which company is now merged with Imperial Airways, Ltd. The whole of Mr. Hubert Scott-Paine's interests were taken over by Commander James Bird, who is the present Managing Director. The Chief Engineer and Designer is Mr. R. J. Mitchell, A.M.Inst.C.E., A.F.R.Ae.S., and the Chief Test Pilot is Captain H. C. Biard.

In 1924 considerable extensions were made for the accommodation of the largest types of flying boats. The first of these was the "Swan," which was successfully launched and flown on March 25. During the first half of 1924 twelve supermarine amphibian bombing flying-boats of a new type and design were constructed to the order of the Spanish Royal Naval Air Service, and the trials of the first of these machines, both on land and on the sea, produced most gratifying results. In the autumn the works concentrated upon a machine of an entirely new design for the Air Ministry. It was completed and delivered in the record time of 7½ months, and is a twin-engined machine, named "Southampton," after the town in which it was built, a class which has proved to be one of the most notable successes in post-war aircraft design. Since delivery of the first "Southampton" in March, 1925, cruises were carried out to the Firth of Forth and down to the Scilly Isles, which proved most successful. Later on, Sir Samuel Hoare, Sir Geoffrey Salmond, and Sir John Salmond made a flight in the "Southampton" of 2½ hours' duration, and expressed their complete approval of the behaviour of the boat, both on the sea and in the air. The factory was now fully employed on a production order from the Air Ministry for these machines



A Batch of Supermarine "Southamptons" at mooring off Cromer.

In addition to this a float-type seaplane was constructed for the 1925 Schneider Cup Race. The machine was entered as the Supermarine-Napier S.4, and set up a new speed record at Calshot on September 13, of an average speed of 226·752 m.p.h., the maximum speed on one lap being 231·406 m.p.h.

A contract was placed by the Australian Government for six of the well-known Supermarine "Seagull" fleet-spotting deck-landing amphibian flying-boats.

From September 3 to 23, four of the "Southampton" class flying-boats, in conjunction with three of H.M. ships, a cruiser and two destroyers, carried out a most successful cruise of 10,000 miles.

On February 6, 1926, the first Australian "Seagull" amphibian flying-boat was christened and launched by Lady Cook, D.B.E., from the company's slipway at the works.

A large triple-engined flying-boat, which will be powered with three air-cooled "Jaguar" engines, is being built to the order of the Royal Danish Naval Air Service, and a new high-speed seaplane, the successor to the S.4, is in course of construction.

VICKERS Limited.

THE wide range of Vickers' aircraft types, designed and constructed at their Weybridge factory, which adjoins Brooklands aerodrome, does not permit of more than a very brief reference to some of their most recent productions. In addition to the usual activity in the manufacture of big twin-engined machines—"Virginia" Long-Distance Heavy Night Bombers and "Victoria" 24-seater Troop Carriers, for the British Royal Air Force—Vickers, during the past 12 months, have produced several very interesting types of smaller craft. Of these, perhaps the most interesting, as being a distinct departure from normal design, is the "Vickers-Wibault" Single-Seater Fighting Scout, which is an all-metal tractor (Bristol "Jupiter") monoplane landplane, built under a novel and patented system of construction. The fuselage is a framed structure of "L" and "T" section duralumin covered with sheet duralumin, which is made rigid by longitudinal corrugations. The monoplane wing is rectangular in plan, with a recess above the cockpit; its spars are of box type, the front and rear spars being braced by a system of diagonal tubes. Ribs are formed of flat duralumin sheet pierced for lightening and riveted to the spars by small angles. Wing covering is made from thin duralumin sheet pleated for attachment to the ribs and corrugated for rigidity. All riveting is done from the outside, and in the event of damage it is thus possible to repair by riveting-on a patch. The leading edge is formed of a rolled sheet riveted longitudinally to the skin. Construction of fin, rudders, tail plane and elevator follows that of the wing. Tail adjustment gear is provided. The oleo undercarriage comprises two wheels mounted on cantilever axles which can move independently. For economy of first cost and maintenance this type of construction has many advantages to offer. A considerable number of these Scouts are being supplied to South America.

The "Vixen" military two-seater tractor biplane has been developed considerably, many improvements being introduced in the latest examples of this class, with which several foreign Governments have equipped their air services. Originally designed for a general purpose military craft to meet British Air Ministry requirements, the "Vixen," according to the equipment carried, is adaptable either as a Two-seater Fighter, a Day Bomber, or as a Reconnaissance machine, the power unit being either a 450 h.p. Napier "Lion" motor, or a Bristol "Jupiter" of the latest type. The Vixen landplane with Napier "Lion" engine has several long-distance flights amongst its achievements, including flights of several machines from Santiago in Chile to Buenos Aires in Argentina and back, the South American High Altitude Record with a passenger, and the completion of the King's Cup Race circuit in Great Britain in 1924 and again this year. In this contest, the "Vixen" flew the course of 1,480 miles at a speed which averaged 142·2 m.p.h. for the whole distance. Another adaptation of the "Vixen" is as a float seaplane, in which form she has proved herself to possess exceedingly fine qualities, having a particularly efficient and surprisingly light system of controls giving great ease of manœuvrability both in the air and on the water. Pilots who have handled the Vixen seaplane have specially commented upon her clean running and the facility with which she takes off and alights.

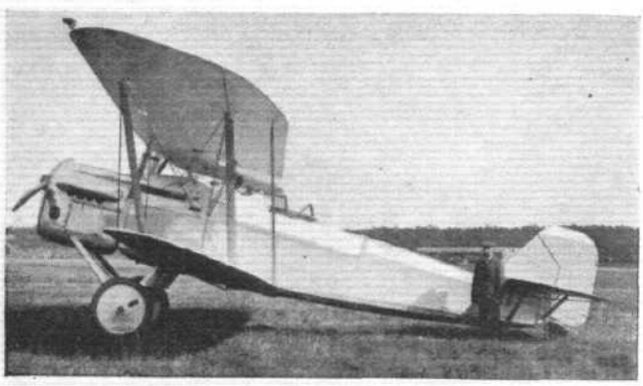
The "Vendace" is another new type worthy of special mention; designed as an advanced training machine, with Rolls-Royce "Falcon III" engine, which provides a generous reserve of power, this aircraft in official trials has proved itself a highly successful deck-landing craft. The pilot who conducted her trials reported that the "Vendace" could not have better flying capabilities for deck landings; the large reserve of power makes a rapid take-off possible and makes for easy handling. Controls are amply large and at the same time light and positive in operation. It was found that there was no tendency for the machine to sway after landing on the deck and she pulled up very quickly. The "Vendace" is easily and quickly convertible from landplane form to float-seaplane.

The "Vespa" (Bristol "Jupiter" engine) has been specially designed for reconnaissance work, and is one of the finest examples of this class of aircraft available at the present day, possessing all those qualities which are necessary for reconnaissance duties, viz.: a very quick take-off, a very low landing speed, a high service ceiling, a steep gradient of climb.

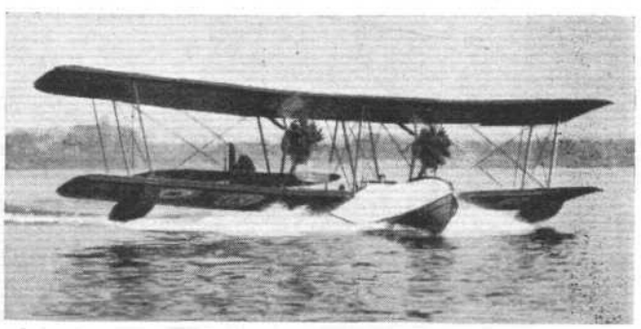
A brief mention should be made of the two seaplanes designed and constructed in Montreal by Vickers' Canadian branch (Canadian Vickers, Ltd.). The "Vedette" was the first to be turned out; this is a three-seater boat seaplane, designed especially for forestry patrol for duty on the Canadian lakes and waterways. This type, of which several examples have been built with different types of power unit, has been particularly successful. The second is the "Varuna," a seven-seater boat seaplane with twin radial engines, having generous accommodation for the stowage of the equipment of the Forestry fire fighters, for the transport of whom from their base to the scene of operations this type has been specially designed.

It is some fifteen years since Vickers became actively engaged in the production of aircraft, and during this period they have manufactured successfully every class of machine from the smallest to the largest, for every purpose—naval, military and civil.

Some data concerning the types mentioned above are contained in the following table:—



Vickers' "Vixen" Military Two-seater (Napier "Lion" Engine).



Canadian-Vickers' "Varuna" Seven-seater Seaplane (Forestry Fire Fighter).

Type.	Motors.	Class.	Height.	Length.	Span.	Weight. Bare.	Weight. Laden.	Speed. Full.	Duration Min.	Duration Cruising.	Climb. Minutes to Heights.
			ft in.	ft. in.	ft. in.			m.p.h.	m.p.h.	Miles.	
Virginia	2 Lions	Bomber, heavy	18 4	51 9	86 6	9,860	16,750	108	46	985	15 mins. to 1,500 m.
Victoria	2 Lions	Troop carrier	17 3	51 7	86 6	10,155	18,100	104	48	400	20 mins. to 1,500 m.
Wibault	1 Jupiter	One-seater scout	10 3	25 6	36 1	1,973	3,060	139 at 4,500 m.	48	600	12·5 mins. to 4,500 m.
Vendace Landplane	1 Falcon	Two-seater training and deck landing	12 7	32 3	44 7	2,626	3,500	118	—	510	—
Vespa	1 Jupiter	Reconnaissance	10 3	31 3	50 0	2,387	3,900	115	44	415	19·5 mins. to 4,500 m.
Vedette	1 Falcon	Three-seater seaplane	11 9	34 0	42 0	2,436	3,480	110	45	460	8 mins. to 1,500 m.
Vixen	1 Lion	Landplane, heavy	13 0	32 9	45 1	3,338	5,550	126½	51	750	16 mins. to 3,000 m.
Vixen	1 Lion	Landplane, light	13 0	32 9	45 1	3,338	5,000	130 at 3,000 m.	48	515	13½ mins. to 3,000 m.
Vixen	1 Lion	Seaplane, naval reconnaissance	14 1	36 9	45 1	3,888	5,550	117 at 3,000 m.	51	455	18 mins. to 3,000 m.

WESTLAND AIRCRAFT WORKS.

WESTLAND CO.

THE Westland Aircraft Works came into existence in 1915 when the exigencies of the time decided the directors of Petters, Ltd., of Yeovil, to offer the services of their firm to the Admiralty. Their offer was accepted, and they were asked, in addition to prosecuting the manufacture of oil engines for camp and ship lighting, as well as lorry components and shells, to prepare for aircraft construction on an expanding basis. For this purpose the present aircraft branch of Petters, Ltd., was formed.

The organisation was entrusted to Mr. R. A. Bruce (then Lieut., R.N.V.R.), who was released by the Admiralty for this purpose in July, 1915.

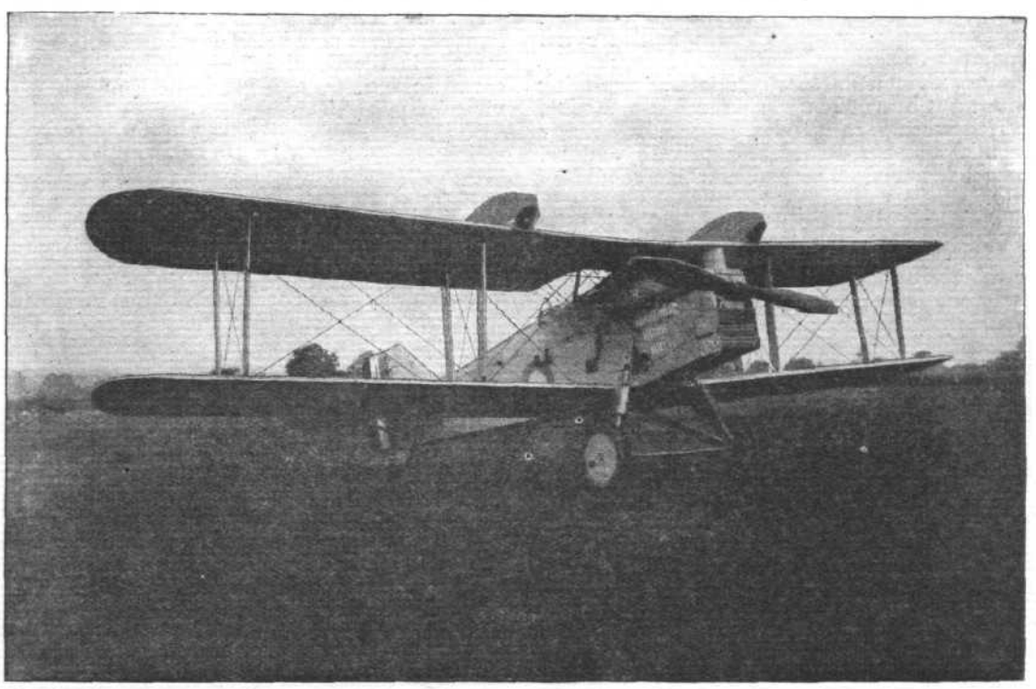
Work commenced at once. Premises had to be built, machine tools installed, and an entire new staff and work-people recruited; but, in spite of this, in January, 1916, the first seaplanes—Short 225 Sunbeams—were delivered to the Government. The first contracts were entirely confined to seaplanes, but later Sopwith 1½ Strutters and D.H.4 Rolls-engined aeroplanes were ordered. During the course of the year, therefore, the premises of the factory were increased, in order to cope with the growing volume of work with which the firm was being entrusted. Additional land attaching to the works was acquired for the purpose of laying out an aerodrome.

It is interesting to observe that up to this point the main activities of the firm had been directed towards construction and assembling as opposed to design, for they had been provided with drawings and schedules that were very complete. When, however, the "Liberty" engines began to be delivered in increasing numbers in this country, it became necessary to re-design machines for this purpose. The Westland aircraft firm had recently made a large batch of D.H.9 machines, and the Aircraft Manufacturing Company were in process of re-designing these to accommodate Rolls-Royce engines. In order to liberate the Aircraft Manufacturing Company for the completion of the production drawings of the twin-engined D.H.10 aeroplanes, the Westland Aircraft Works were entrusted with the completion of the production drawings of the D.H.9A machines, and were made responsible for designs and modifications of all D.H.9A work from that date. From the drawings thus produced by the firm a large number of other contractors built aeroplanes of this type, and very large numbers were turned out by the Westland Aircraft Works prior to the Armistice.

In the meanwhile the Air Ministry were asking for designs of certain types of fighting scout seaplanes, two examples of which—N.16 and N.17—were designed by the firm. These were succeeded by a single-seater land fighter, and two-seater land fighter—the Westland "Wagtail" and Westland "Weasel" respectively. These were originally designed for the A.B.C. "Wasp" and the "Dragonfly" engines, but later were replaced by the "Lynx" and the "Jupiter" or "Jaguar" respectively.

With the Armistice, attention was immediately turned to the design of a reliable commercial aeroplane, and by July, 1919, the first Westland limousine was in the air. This was purely a commercial machine, designed and built throughout for passenger and goods carrying, and was one of the very earliest machines of this type as compared with the adapted war machines. These machines gave excellent service, and were used in this country on the London-Paris service, and also for special work abroad. In 1920 the Air Ministry held a competition for civil aircraft, and an enlarged edition of the Westland limousine fitted with Napier "Lion" engine was designed and built for the competition and won the first prize of £7,500 for the Commercial Aircraft, Small Class. This machine accommodated five passengers and luggage in addition to the pilot, and had a maximum speed of 118 m.p.h. When the British Government held their Light Aeroplane Competition the firm produced the Westland "Wood Pigeon," which was a highly successful example of its class.

The Westland Aircraft Works progressive policy has been maintained. They are continually at work experimenting on the efficacy of new designs, and a 4-ft. wind channel has been constructed with this end in view.

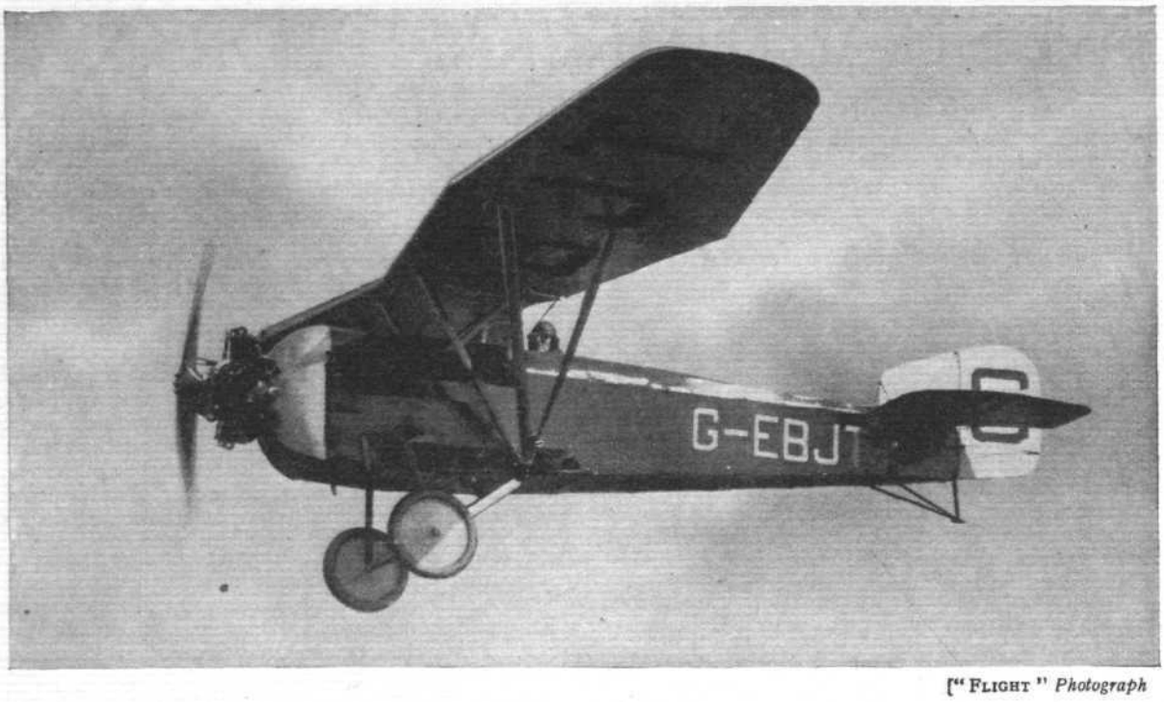


The Westland "Yeovil."

Governmental work and experimental work, therefore, is the present field of activity of the company. They have increased their scope in the latter section by securing the services of Capt. Hill, who is perfecting his designs for the new "tailless aeroplane." A light aeroplane of this class has already been built, and its trials were attended by remarkable success, for Capt. Hill flew the machine in altitudes that would have made other aeroplanes uncontrollable. Considerable experimental work is, however, necessary in order to demonstrate the possibility of this design for greater wing loading and higher speeds, and new designs based on such requirements are being completed so that experimental machines may be tested out on the Westland aerodrome.

Amongst other machines produced at the Westland Aircraft Works is the Yeovil day bomber.

It marks an important stage in the development of this



["FLIGHT" *Photograph*

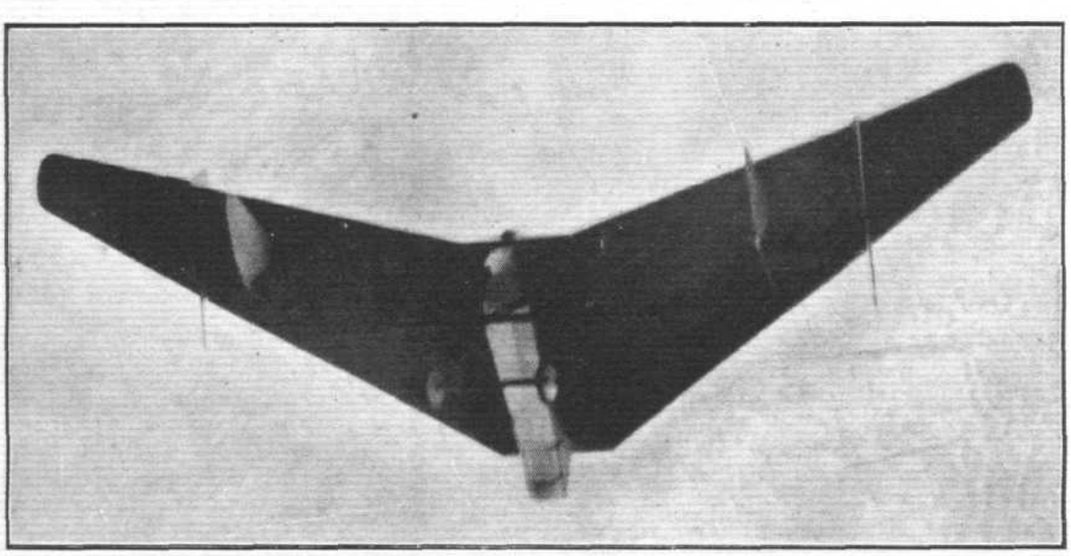
The Westland "Widgeon."

type of aircraft as it possesses great stability, gravity feed of petrol from tanks in the upper plane, and oleo-rubber undercarriage with wide track. It has a Rolls-Royce "Condor" engine of 670 h.p., with a Leitner-Watts metal propeller. The performance of the machine, which was built for the Air Ministry, is highly satisfactory.

Among the firm's experimental projects is an interesting single-seater fighter. The machine is a monoplane capable of very high performance. It is not being built to any Air Ministry specification, but purely as a private venture, and has many novel features. The first machine should be in the air shortly.

A good deal of work has also been done on developing the light aeroplane, and during the last three years several light machines have been built, chiefly with the idea of obtaining the necessary data to turn out a commercial machine of robust construction and particularly suitable for the owner-pilot. An improved model of the Westland "Widgeon" light aeroplane now being developed will be an ideal machine for use in the Dominions—easy to fly, simple to maintain, cheap to run, easy to get in and out of, with an excellent view for pilot and passenger.

This, then, is a brief sketch of the activities of the firm which established Yeovil as the principal air centre of the West of England, a fact that was demonstrated very forcibly during the general strike, when its organisation was at the disposal of a committee formed for the distribution of newspapers by air to all parts of England.



THE BOOMERANG: Plan view, from below, of Capt. Hill's tailless aeroplane "Pterodactyl." This view was secured with the camera pointing almost vertically upward.

The first product of this firm, the five-engined sea-going flying-boat *Richard-Penhoët*, was launched last summer at St. Nazaire, and has since been undergoing flying tests. These have, on the whole, been very satisfactory, considering that this huge machine, which weighs fully loaded 18 tons, is not only the first seaplane ever built by this firm, but that it also incorporates a great variety of novel ideas which will, naturally, take some time to "reduce to practice." Hence M. Richard deserves sincere congratulations on having carried a bold idea into the realm of practice.

The *Richard-Penhoët* is, as our photograph shows, a thick-wing, cantilever, monoplane flying-boat which is fitted with five 420 h.p. Gnôme-Rhône "Jupiter" engines driving tractor airscrews. An idea may be had of the bigness of this seaplane by looking at the relative size of the engines, which appear as mere toys against the enormous wing, which has a maximum depth of 1·80 m.

The framing of the wings is of timber, reinforced with stiffeners of high-tensile steel. The hull is likewise of timber construction. The internal arrangement includes two decks. The pilot's cockpit is situated between the wings, near the leading edge.

As this machine is mainly considered as an experimental type, no definite commercial or military equipment has as yet been provided for it, though its great weight-lifting qualities make it particularly adaptable to transport and long-range reconnaissance work.

Specification. — Engines, five 420 h.p. Gnôme-Rhône "Jupiter"; span, 40 m.; length, 27 m.; maximum wing chord, 9 m.; maximum wing depth, 1·80 m.; height of hull, 4 m.; beam of hull, 4 m.; weight empty, 13,000 kg.; weight loaded, 18,000 kg.; maximum speed, sea level, 157 km.p.h.

Owing to its size, it has been found impossible to bring the *Richard-Penhoët* into the Grand Palais; however, no visitor to the Salon will be allowed to ignore its existence, for the St. Nazaire Co. will exhibit a photograph of truly heroic size, 38 m. long by 8 m. high, showing the big flying-boat in almost life-like proportions.

The St. Nazaire firm will also exhibit a turntable catapult launching gear for naval aircraft, which was recently tested, with satisfactory results, by the French Navy at St. Nazaire. This catapult is operated by compressed air and gives the machine to be launched a flying-off speed of 80 km.p.h. The overall length of the catapult is 20·25 m.

SALMSON-BECHEREAU (S.R.A.P.)

THE S.R.A.P. (*Société pour la Réalisation d'Avions Prototypes*) is a new firm with offices in Paris, which has secured the technical services of M. Béchéreau, the well-known one-time designer of the Deperdussin and Spad aeroplanes.

The S.R.A.P. will exhibit a Salmson-Béchéreau C.2 two-seater fighter (500 h.p. Salmson C.18), the fuselage of a Béchéreau mail aeroplane, a Béchéreau shock-absorbing system for Goliath aeroplanes, and a patented joy-stick.

The Salmson-Béchéreau C.2 Two-Seater Fighter.—The Salmson-Béchéreau Two-seater fighter is a strut-braced monoplane, having two outer wing struts, which are fixed to the undercarriage and an intermediate Warren truss The construction is of conventional lines, consisting essentially of a wire-braced timber framework. The wing struts are

The Salmson-Bechereau C.2 two-seater fighter with 500 h.p. Salmson.

faired steel tubes. The wing is covered with fabric except at the leading edge, where multi-ply is used to give added strength. The fuselage is built up on four main longerons and plywood formers, over which a false work of spruce stringers is fixed to give the fuselage a good streamline. The engine compartment as well as the pilot's cockpit are covered with sheet aluminium; the rest of the fuselage as well as the tail unit are fabric-covered.

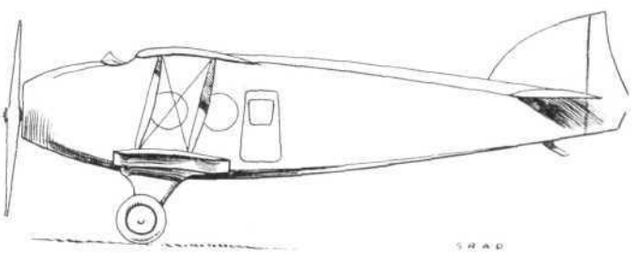
The under-carriage struts are plywood frames of U type.

Specification.—Engine, 500 h.p. Salmson C.18; span, 14·60 m.; length, 10 m.; height, 3 m.; wing area, 35 sq. m.; weight empty, 1,558 kg.; fuel load, 292 kg.; crew (two), 160 kg.; armament and equipment, 350 kg.; weight loaded, 2,360 kg.

Official Performances (S.T.Aé. Tests)

Altitude:	3,000	4,000	5,000	6,000	6,700
Speed, km. p.h. ..	220	215	209	200	—
Climb, mins... ..	9′	13′ 51″	20′ 12″	31′ 40″	47′ 38″

Ceiling, 7,150 m.



The Salmson-Bechereau SRAP Commercial Aeroplane with 500 h.p. Salmson engine.

The Salmson-Béchéreau Mail Aeroplane.—The Salmson-Béchéreau mail aeroplane, of which only the fuselage will be exhibited at the Salon, is a two-bay biplane of timber construction fitted with the 500 h.p. Salmson engine. The wings have a negative stagger and the bottom wing has a greater span than the top wing. The fuselage fills out the entire gap of the wings. The pilot's cockpit is situated ahead of the leading edge of the top wing. The cabin of this machine, which has not yet undergone official flying tests, is designed to accommodate seven passengers.

Specification.—Engine, 500 h.p. Salmson C.18; span, 16·90 m.; length, 10·70 m.; height, 3·60 m.; wing area, 60 sq. m.; weight empty, 1,840 kgs.; fuel load, 600 kgs.; crew (one), 80 kgs.; passengers (seven), 560 kgs.; luggage, 440 kgs.; weight loaded, 3,520 kgs.; maximum speed (designed), 190 km. p.h.; range in still air, 800 kms.

SCHRECK—F.B.A.

THE F.B.A. Company (Louis Schreck, *constructeur*) is the oldest seaplane constructing firm in France, and one which has specialized on flying-boats ever since 1912. Since the war a very satisfactory retractable landing gear for flying-boats has been developed, and this can be fitted to all the F.B.A. types of flying-boat save the school machine.

The exhibit of the company consists of an F.B.A. type 21 HMT-6 transport amphibian flying-boat, which is fitted with a 450 h.p. Lorraine-Dietrich engine. It was this type of machine which won the *Grand Prix des Hydravions de Transport* of 1925 and which established the world's seaplane altitude record with 1,000 kg. of ballast.

The F.B.A. 21, which is shown in the accompanying photographs with the retractable landing gear removed, is a single-bay biplane flying-boat of particularly clean and pleasing lines, the excellent streamlining of the hull and of the engine nacelle being specially worthy of note. The construction is of the conventional type, incorporating a multiply-planked hull and wire-braced timber wing frames. The interplane and engine struts are likewise of timber, but the cabane, as well as the wing-tip float and tail-plane bracing struts, are of steel tubing. The wings and the tail surfaces, with the exception of the vertical fin, are fabric covered. The vertical fin, which is built integral with the hull, is covered with plywood.

The F.B.A. 21 (the initials H.M.T. meaning *hydravion mixte de transport*) shown at the *Salon* will be equipped as a transport seaplane accommodating four passengers in an open cockpit behind the bottom wing—a position which most passengers will undoubtedly prefer to that given them on most other flying-boats where they are seated in the bows and so contribute to the shock absorbing qualities of the machine in case of a crash. The pilot's cockpit, containing two seats with dual control, is located flush with the leading edge of the bottom wing, where he is afforded an excellent range of vision.

Specification.—Engine, 450 h.p. Lorraine-Dietrich; span (top wing), 15·40 m.; span (bottom wing) 14·40 m.; length, 10·56 m.; height, 4·20 m.; wing chord, 1·90 m.; interplane gap, 2·40 m.; total wing area, 53·5 sq. m.; weight

The F.B.A. 21 HMT-6, with 450 h.p. Lorraine, is a transport amphibian flying boat

empty, 1,820 kg.; weight of fuel, 423 kg.; weight of crew (2), 160 kg.; pay load, 437 kg.; weight loaded, 2,840 kg.

Official Performances (S.T.Aé. Tests)

Altitude	1,000 m.	2,000 m.	3,000 m.	4,000 m.
Speed, km.p.h.	186	181	175	168
Climb, mins.:	5 mins.	30 secs. 14 mins.	30 secs. 30 mins.	56 mins.

Service ceiling, 4,400 m.; range in still air, 600 km. unstick time on water, 22 secs.; unstick time on land, 18 secs.

The F.B.A. 21 can also be equipped as a reconnaissance bomber or as an ambulance seaplane. In the latter form the machine accommodates in addition to the crew two stretcher cases and a hospital attendant.

S.E.C.M.

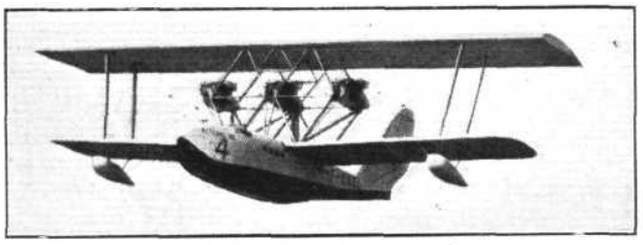
THE S.E.C.M. company (*Société d'Emboutissage et de Constructions Mechaniques*) will exhibit two aeroplanes at the Salon. One will be the S.E.C.M.-Amiot 120 B.N.2, a two-seater night-bomber with 600 h.p. Renault engine on which Pollon, Van Caudenberg and Amaurich made an attempt early in the autumn to beat the world's straight-line distance record. The other will be the new type 150 three-engined commercial aeroplane, which may be fitted with either 300 Renault or 350 Hispano engines. Both machines are of all-metal construction, the material used being mostly duralumin, of the form developed by this firm during the last five or six years, and which has been illustrated in FLIGHT on several occasions.

Specification of S.E.C.M.-Amiot 120 B.N.2:—Engine, 600 h.p. Renault. Span, 19·0 m.; length, 14·0 m.; wing area, 85 sq. m.; weight empty, 1,760 kgs.; weight loaded, 3,400 kgs. Maximum speed at ground level, 200 km./hr.; climb, 5,000 m. in 45 mins.

The S.E.C.M. 150 T is a cantilever monoplane, with one central engine in the nose of the fuselage and two wing engines. The two latter are accessible during flight, it being possible for the engineers to get to them through the thick wing. The cabin has accommodation for 14 passengers, and the power reserve is such that the machine will fly on any two of its three engines. With one engine it loses height very slowly. Following is a specification of the 150 T.: Span, 23·9 m.; length, 18·0 m.; wing area, 100 sq. m.; weight equipped, 4,030 kgs.; pay load, 1,680 kgs.; speed at ground level, 235 km./hr.; cruising speed, 190 km./hr.; range (in still air), 1,000 kms.

S.P.C.A.

THE S.P.C.A. firm (*Société Provençale de Constructions Aéronautiques*) which was established last year is the aircraft establishment of the big shipbuilding firm of *Société Provençale de Constructions Navales*, with shipyards at La Ciotat, near Marseilles, where the aircraft works of the S.P.C.A. are also located. The latter company was more particularly created for the purpose of producing a type of aircraft that has not received much attention in France so far—that is, a multi-engined flying boat for commercial service, in particular on the trans-Mediterranean routes. French shipping circles are beginning to take a serious interest in commercial sea-flying, which, they realise, must sooner or later supplement their



THE S.P.C.A. "Meteore-63 is a three-engined commercial flying boat, with 180 h.p. Hispano engines. Only a scale model will be exhibited.

own surface services. As the parent firm of the S.P.C.A. is closely allied with the *Messageries Maritimes* shipping line, and the latter is also a big shareholder in the new *Compagnie Aérienne France-Afrique* that was recently formed with the participation of the Latécoerè Air lines for the purpose of establishing flying boat services between France and North Africa, the products of the S.P.C.A. will be watched with much interest.

The S.P.C.A. will exhibit at the *Salon* a scale model of its Météore-63 type commercial flying boat, fitted with three 180 h.p. Hispano-Suiza engines, with which the Latécoère Air Lines are at present conducting an experimental mail service between Marseilles and Algiers. It will be remembered that it was this machine, piloted by the veteran Burri, which won the Commercial Seaplane Competition organised by the French Under-Secretariat for Aeronautics last summer. The Météore-63 is incidentally the first French transport seaplane that has obtained a first-class airworthiness certificate from the Bureau Véritas.

The Météore-63 is a triple-tractor, biplane flying boat of conventional construction, timber being used throughout except for the bracing struts of the engine group, which are steel tubes, and for the various fittings, which are mostly steel stampings. The wings are fabric-covered.

The hull comprises two compartments, one for six passengers being located just aft of the pilots' cockpit, and the other, aft of the lower wings, for mails and goods. The passenger cabin is electrically heated.

Specification of the Météore-63 Flying Boat.

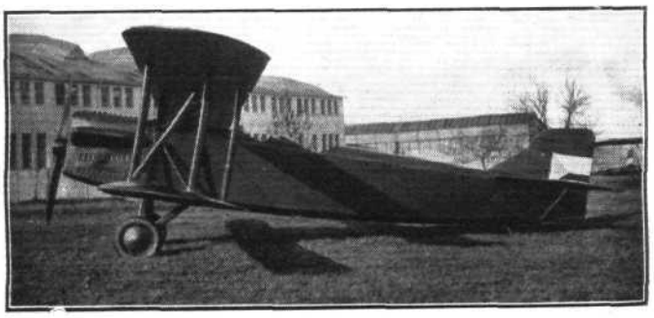
Engines, three 180 h.p. Hispano-Suiza; span, 20·0 m.; length, 13·0 m.; height, 5·21 m.; wing area, 103 sq. m.; weight, empty, 3,400 kg.; fuel and useful load, 1,830 kg.; weight, loaded, 5,230 kg.; max. speed, 167 km.p.h.; cruising speed, 140 km.p.h.; min. speed, 80 km.p.h.; service ceiling, 4,000 m.; cruising range, 7½ hrs.; safety factor, 6.

VOJENSKA TOVARNA NA LETADLA

THE Military Aircraft Factory of Prague, whose chief designer is M. Smolik, will be represented by no less than three complete aeroplanes—the S.16, the S.18, and the S.20.

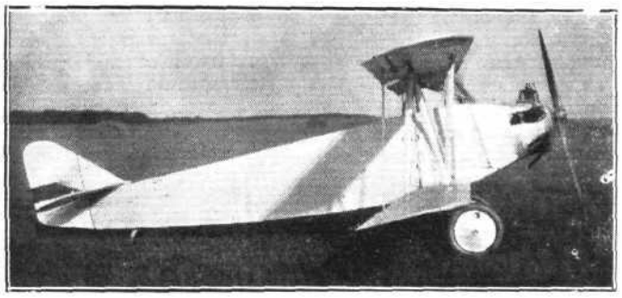
The Vojenska S.16 is a long-distance reconnaissance or day-bombing biplane characterised by single-bay wing bracing in spite of a considerable wing span. It is fitted with a 450 h.p. Lorraine-Dietrich engine, but can also be supplied with Napier "Lion," Hispano-Suiza, Renault, or B.D.

The machine is of all-metal construction, except for the covering, which is fabric. The fuselage is of steel-tube construction, joined together in two places to form three separate sections—the engine bearers, the cockpit portion, and the rear portion. The petrol tank is placed inside the fuselage, and is stated to be protected by a rubber covering,



The Vojenska S.16 long-distance reconnaissance biplane with 450 Lorraine-Dietrich.

apparently somewhat after the style of the Imber self-sealing tank. This tank has a capacity of 400 kg. A gravity tank holding 174 kg. is placed in the top centre section. This quantity of fuel suffices for a flight of five hours' duration at full throttle. The armament consists of one fixed Vickers gun, and two Lewis guns on the usual gun ring. The wings are of Duralumin construction.



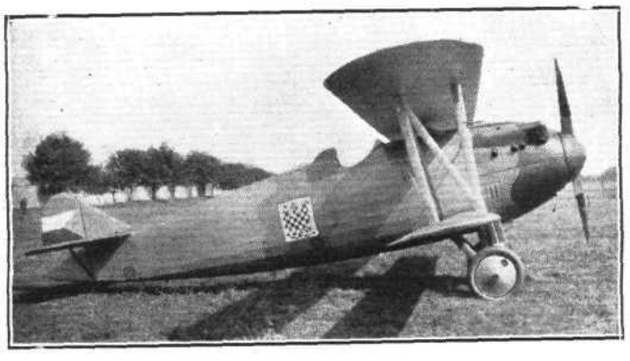
The Vojenska S. 18 is a school machine with 60 h.p. Walter Engine.

Following are the main characteristics of the Vojenska S.16: Wing span, 15·5 m.; length overall, 9·2 m.; wing area, 47 sq. m.; weight, empty, 1,200 kg.; load, 1,050 kg. (military load, 448 kg.); total loaded weight, 2,250 kg. Top speed at ground level, 225 km./h.; speed at 5,000 m., 194 km./h.; service ceiling, 6,500 m.; range, 1,237 kms.

*The Vojenska S.*18 is a school machine fitted with 60 h.p. Walter radial air-cooled engine. It is, as distinct from the S.16, of wood construction. The biplane wings are of normal form and construction, and the fuselage is of the plywood-covered box type. The wing bracing is a little unorthodox in that on each side a pair of Vee struts run from the bottom front spar root to points on both top spars. Thus the usual rear inner interplane strut is missing. The top plane, incidentally, is in one piece and has no dihedral. The petrol tank, with sufficient petrol for 2½ hours, is housed in the top plane, giving direct gravity feed. It is understood that although this is a school machine, it has been built with sufficiently high factors of safety to permit of its being stunted in every way.

*Characteristics of the S.*18.—Wing span, 10 m.; length overall, 6·682 m.; wing area, 17 sq. m.; weight, empty, 254 kg.; fuel, 40 kg.; crew, 160 kg.; total loaded weight, 554 kg. Speed at ground level, 140 km./h.; landing speed, 68 km./h.; climb to 1,000 m. in 6 mins.; Service ceiling, 3,500 m.

*The Vojenska S.*20 is a single-seater fighter fitted with a 300 h.p. Hispano-Suiza engine. The wing design and construction are normal, the machine having a top plane of slightly greater span and chord than the bottom, in order to improve the visibility. Wood construction is employed in the wings, and ailerons are fitted to the lower wing only.



The Vojenska S. 20 single-seater fighter with 300 h.p. Skoda-Hispano.

The fuselage is of steel-tube construction, specially designed to facilitate repairs. The engine bearer is of steel tube and Duralumin, and supports a Skoda-built Hispano-Suiza of 320 h.p. at 1,800 r.p.m. The petrol tank, with a capacity of 215 litres, or sufficient for 2¼ hours, is contained inside the fuselage. The tank is protected by a rubber jacket. A service tank in the top plane has a capacity of 35 litres, or sufficient for 22 minutes at full throttle. Two Vickers guns lie above the engine, and are fired from the control stick. The S.20 is also equipped with a Heineke parachute. The Lamblin radiators are fitted to the undercarriage legs.

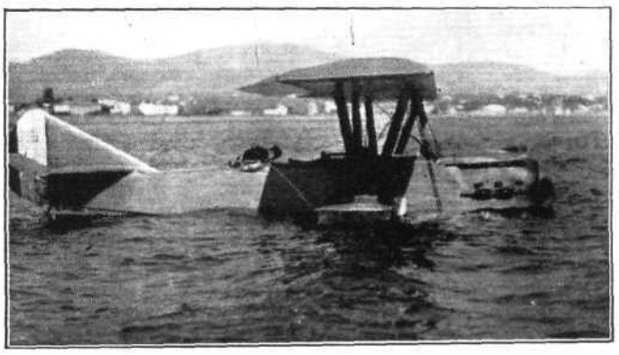
*Characteristics of the Vojenska S.*20.—Span, upper plane, 9·7 m.; lower plane, 8·2 m.; length overall, 7·441 m.; wing area, 18·4 sq. m.; weight, empty, 728 kgs.; useful load, 145 kgs.; fuel, 175 kgs.; total loaded weight, 1,048 kgs. Speed at ground level, 257 km./h.; speed at 2,000 m., 261 km./h.; climb to 1,000 m. in 1·5 mins.; to 5,000 m. in 13·8 mins.

VILLIERS

THE exhibit of the François Villiers Company will consist of a Villiers type II naval two-seater fighter aeroplane (*avion marin*), with 450 h.p. Lorraine-Dietrich engine, and of a Villiers type V two-seater night fighter, also with 450 h.p. Lorraine-Dietrich engine.

The Villiers Type II Naval Two-Seater Fighter.—The Villiers type II naval two-seater fighter was specially designed for fighting heavy flying-boats with the advantage of incorporating the features of a landplane but having at the same time the ability of alighting safely on water. In other words, the Villiers II is a "seagoing aeroplane," which is particularly adapted to use on board aircraft carriers.

The fuselage is of the water-tight type, being constructed on the lines of a flying-boat hull, with timber framing. The wings, which are also timber-framed, are of the sesquiplane type, with Vee interplane struts. The bottom wing, which is mounted midway up the fuselage depth, carries wing tip



The Villiers Type II, 450 h.p. Lorraine, is a landplane capable of floating after a descent on the sea. It then has to be hoisted on board a vessel.

floats. The undercarriage may be dropped by the pilot for alighting on the sea. For landing on the deck of aircraft carriers, the machine incorporates an arresting gear which engages with the transverse wires of the deck.

The petrol tank is equipped with an instantaneous emptying device, which is operated by carbonic acid contained in a bottle.

The armament consists of two synchronised Vickers guns and two Lewis guns on ring mounts.

Specification.—Engine, 450 h.p. Lorraine-Dietrich; span, 13·00 m.; length, 9·46 m.; height, 3·68 m.; wing area, 40 sq. m.; weight, empty, 1,565 kg.; fuel load, 235 kg.; useful load, 250 kg.; weight, loaded, 2,050 kg.; maximum speed, sea level, 218 km.p.h.; speed at 5,000 m. altitude, 202 km.p.h.; speed at 6,000 m. altitude, 196 km.p.h.; climb to 6,000 m. altitude, 29 mins.; theoretical ceiling, 6,250 m.

The Villiers Type V Two-Seater Night Fighter.—The Villiers type V Two-Seater Night Fighter, fitted with the 450 h.p. Lorraine-Dietrich engine, is a single-bay biplane of timber construction. The wings are fabric-covered and the interplane struts are faired duralumin tubes, which are fitted with an adjusting device for length. The cabane struts, of the diverging (outward sloping) type, are steel tubes. The fuselage is built along the lines of the Villiers type II, that is, with a water-tight hull arrangement. The engine bearers are duralumin box girders. Radiators are of the Lamblin 1925 type. The petrol tank may be jettisoned in flight. The undercarriage is rubber sprung.

The armament consists of two fixed Vickers gun and two flexible Lewis guns. The equipment includes a heating arrangement for the armament and the crew, landing flares and searchlight, Michelin bomb release and wireless outfit.

Specification.—Engine: 450 h.p. Lorraine-Dietrich. Span: 12·00 m. Length: 8·750 m. Height: 3·300 m. Wing area: 40 sq. m. Weight, empty: 1,274 kg. Useful load:

465 kg. Fuel load: 366 kg. Weight, loaded: 2,105 kg. Maximum speed, sea level: 224 km.p.h. Speed at 4,000 m. altitude: 210 km.p.h. Min. speed: 92 km.p.h. Climb to 6,500 m.: 43 mins. Service ceiling: 7,000 m.

WIBAULT

M. MICHEL WIBAULT is the great French specialist of all-metal aircraft construction whose name has now for several years past been associated with the production of military aeroplanes of the strut-braced parasol monoplane type. The novelty of many of his ideas has somewhat handicapped him in military circles until recently, when the sheer merit of his designs brilliantly asserted itself at the recent French competition for single-seater fighters, as a result of which a series of Wibault 7 C.1 fighters were ordered by the French Air Service. This type is also being constructed for the Chilian Air Service by Vickers, Ltd., under licence from M. Wibault.

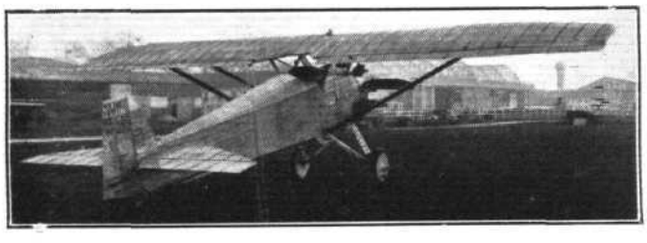
It is this type of aeroplane which will be exhibited at the Wibault stand. The Wibault 7 C.1 is entirely built of duralumin, the fuselage being built up of angle sections and strips while the wings have duralumin tube spars and ribs of the same alloy. Both the wings and the fuselage are covered with sheet duralumin, which is applied in small strips and secured to the framework with a patented metal seam. This construction allows of rapid and easy repairs.

The landing gear is of the axle-less type with oleo-pneumatic shock-absorbers.

The engine is a 420 h.p. Gnôme-Rhône Jupiter.

The performances, weights, etc., given hereafter include the full military equipment, namely, two wing guns firing over the propeller, two fuselage guns synchronised with the engine, 2,000 rounds of ammunition, oxygen inhalator, fire extinguisher, self-starter, electrical equipment, parachute, camera and signal apparatus.

The fine visibility and the low landing speed of this machine make it also a desirable type for photographic work as well as for night reconnaissance and fighting.



THE WIBAULT 7 C.1, with "Jupiter" engine, is a single-seater fighter of all-metal construction. Vickers, Ltd., have built a number of these machines for the Chilean Government.

Specification of the Wibault 7 C.1 Fighter

Engine, 420 h.p. Gnôme-Rhône Jupiter; span, 11·0 m.; length, 7·450 m.; height, 2·90 m.; wing chord, 2·10 m.; wing area, 22·2 sq. m.; weight, empty, 827 kg.; useful load, 352 kg.; fuel load, 265 kg.; load carried, 617 kg.; weight, loaded, 1,444 kg.; wing loading, 65·5 kg./sq. m.; power loading, 3·44 kg./h.p.; safety factor, 11·8.

Official Performances (S.T.Aé. Tests).

Altitude (m.) ..	0	1,000	2,000	3,000	4,000	5,000	6,000
Max. speed (km.p.h.)	222	222·5	222·6	223·2	223·2	221·4	217·7
	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.	m. s.
Climb	2 42	5 14	7 57	10 56	15 17	21 14	

Climb to 7,000 m. in 29 min. 22 sec.; ceiling, 8,500 m.; low speed at 850 m. altitude, 104·2 km.p.h.; unstick run, 106 m.; landing run, 190 m.

The aircraft factory of Avions Michel Wibault at Billancourt (Seine) is at the present time exclusively engaged in production and development work for the French Army Air Service. They have, beside the production order for 7 C.1's, in course of construction a single-seater attack machine, type 13 C.1, with 400 h.p. Hispano-Suiza engine, and a type 12 C.2 two-seater fighter with 500 h.p. Hispano-Suiza engine. Other types recently produced include the 8 C.2 two-seater fighter (500 h.p. Hispano-Suiza), the 9 C.1 single-seater fighter (400 h.p. Hispano-Suiza), and the 10 G.R. long reconnaissance two-seater (420 h.p. Gnôme-Rhône Jupiter), all of which have passed the S.T.Aé. tests.

AERO TOVARNA LETADEL

IT is regretted that, owing to the late arrival of the necessary material, it has not been found possible to include, in its proper alphabetical position in the pages dealing with the Paris Aero Show, the account of the two machines which will be exhibited by the Czechoslovak firm *Aero Továrna Letadel*, of Prague. The data, specifications, and photographs did not arrive at our offices until the day before we went to press with this week's issue of FLIGHT, but, in order that our readers should have as complete an account as possible of the machines to be exhibited, we have included the products of this well-known Czechoslovak firm here, at the end of the Paris Show article.

The two machines exhibited by this firm will be a type

The Aero A.11 reconnaissance two-seater with 240 h.p. Perun engine.

Aero A.11 two-seater reconnaissance machine, and an Aero A.30 long-distance reconnaissance biplane.

The type *A.11* is produced with two types of engine, the A.11, with a 240 h.p. Walter water-cooled engine, and the Aero Ab.11, which has a 240 h.p. Perun engine. The A.11 is of mixed construction in that the fuselage is a steel-tube structure, while the wings are of normal wood and metal fittings construction. The machine is fitted with dual controls, the joy-stick fitted in the observer's cockpit being detachable and carried, when not in use, in clips on the side of the cockpit. A petrol tank of 185 litres capacity is installed in the fuselage between the front cockpit and the engine, while a service tank is built into the top plane and has a capacity of 120 litres, giving a total of 305 litres, which is stated to be sufficient for 3½ hours' flying at full throttle.

The armament consists of a fixed machine gun firing through the propeller and two swivelling guns mounted on a turntable. A camera of 70 or 50 cm. focus is placed to the left of the observer, and is mounted on rubber shock absorbers. In addition, the observer's cockpit contains a wireless outfit comprising sending and receiving set. The machine is equipped with two parachutes. A 240 h.p. reconnaissance machine does not impress one as being quite powerful enough

The Aero A.30 two-seater long-distance reconnaissance biplane, 450 h.p. Lorraine engine.

in these days, but the A.11 has a series of very excellent flights to its credit, including a number of Czechoslovak records. Following are the main data relating to the Aero A.11: span, 12·78 m.; length o.a., 8·34 m.; wing area, 36·51 sq.m.; weight empty, 1,027 kg.; fuel, 189 kg.; useful load, 318 kgs.; total loaded weight, 1,534 kgs. Maximum speed at ground level, 215 km./hr. Climb to 1,000 m. in 2 mins.;

to 2,000 m. in 5 mins. 10 secs.; to 3,000 m. in 8 mins. 30 secs.; to 4,000 m. in 12 mins. 50 secs.; to 5,000 m. in 19 mins. 20 secs. Service ceiling, 7,600 m. It will be seen that for its power the Aero A.11 has a very good performance.

The *Aero Tovarna A.30* is a long-distance reconnaissance biplane fitted with 450 h.p. Lorraine-Dietrich engine. Other power plants of approximately the same weight and power can, however, be supplied. Particular care has been taken in the arrangement of the pilot's instrument-board in this machine, so that such instruments as have to be constantly watched are so placed as to be easily seen without the pilot having to turn his head to any great extent. The fuselage is of steel-tube construction, but welding is not employed in parts that have to resist any severe stress. The engine mounting, also of steel-tube construction, is easily detachable.

The wing construction is the usual, with spars and ribs of wood, and internal drag struts of steel tube, the drag bracing being by wire.

The armament of the A.30 is the usual, *i.e.*, a fixed Vickers gun firing through the propeller, and two Lewis guns on a rotating gun ring for the observer. A form of compensator is employed in order to relieve the air pressure on the aft guns when flying at high speed. A wireless outfit is carried in the observer's cockpit. Parachutes, fire extinguishers and oxygen apparatus are also carried.

No performance data are available.

"THE FIRST WORLD FLIGHT"

As sportsmen, we have from the first given our whole-hearted and envious admiration to the four gallant American lads who made the first circuit of the world by air; and our equally sincere sympathy to the other four who set out but did not get round. These young followers of Odysseus have been fortunate in finding a worthy Homer to tell of their wanderings, in the person of Mr. Lowell Thomas, whose delightful lectures at Covent Garden are still fresh in the memory of Londoners. For of the eight adventurers only one, Leslie Arnold, had any gift for expressing his thoughts by tongue and pen. Mr. Lowell Thomas has made of the record a delightfully vivacious book of adventure, enjoyable by all ages and both sexes.

It goes without saying that a review in FLIGHT must look first for the technical lessons of the flight as told in the book. The outstanding point of this nature is the way in which the Douglas World Cruisers stood up to the gruelling task which was set them. The Americans admitted, when they met Locatelli in Iceland, that his Dormier Wal flying-boat "appeared to be the most efficient plane for long-distance flying that we had ever seen"; but none the less, the Douglas machines did all that was asked of them. The Liberty engines sometimes let them down, but the Douglas biplanes never.

There was occasional damage in a heavy sea, but it was usually repairable on the spot. The machines were heavily loaded and slow, and at Haiphong, for example, in a dead calm on a river, it took the pilots three hours to get off the water, and even then they could not get on their steps until they had taxied 12 miles down the river, dodging the native shipping, to reach the ripples in the Gulf of Tongking. But of mechanical breakdown in the aeroplanes there was none.

The Liberty engines did not stand the strain so well. The story of the engines is briefly as follows: The first set of engines flew from Seattle to Japan, some 3,000 miles. The second set were installed at Kasumigaura. When flying between Haiphong and Lourane in French Indo-China, the engine in Lowell Smith's machine, the "Chicago" developed a leaky radiator, over-heated, and practically broke up. A con. rod came through the crankcase. Smith landed on a lagoon, and a new Liberty was brought from Saigon, and was installed. Between Allahabad and Ambala, the engine in Nelson's machine, the "New Orleans," developed a leaky cylinder. A new cylinder was obtained from the British store at Lahore and was installed. When approaching Karachi, this same engine commenced to fly to pieces in the air, from some cause which was never ascertained, and Nelson only just struggled into Karachi. At Karachi, the third set of new engines was installed. This set took them successfully to Brough, where the fourth set of Libertys was installed. Flying from the Orkneys to Iceland, the oil pump in the engine of the "Boston," Leigh Wade's machine, failed. He alighted on a very rough sea, and though the machine was found and taken in tow by the U.S. cruiser *Richmond*, it was battered to pieces by the waves and sank. At Ivigtut, in Greenland, the two survivors installed their fifth set of engines—at least, it was the fifth for the "New Orleans," and the sixth for the "Chicago." Flying from Greenland to North America, Lowell Smith in the "Chicago," found both his petrol power pump and his wind pump out of action, while an oil leak also developed. His companion, Arnold, worked the hand pump for three hours, and they made America. Ten miles beyond Baltimore, the engine of the "New Orleans" stopped dead, the timing gears having slipped, just above the only possible landing ground for miles. At San Diego, engines were changed for the last time, the "New Orleans" receiving her sixth, and the "Chicago" her seventh. If I have overlooked any other changes of engines, I offer my apologies to the manufacturers of the Liberty motor.

Of course, it was great good luck for the world-fliers that they found Liberty engines in use by the Royal Air Force in India. One rather wonders whether their legs were pulled by the R.A.F. men at Ambala, or whether pure Yankeeism is responsible for this passage, which, by the way, is put into the mouth of Erik Nelson, who is by birth a Swede:—"To our delight, we found the British aviators in India were all using our Liberty motors—two thousand of them! And they swore by them, too. This was gratifying, because European engines had long held first place in the aeronautical world. But since the War the Liberty 12 has come to the front." As a matter of sober fact there are two bombing squadrons in India equipped with the D.H.9A-Liberty, namely, Nos. 27 and 60. And if they were to keep 2,000 Libertys for those two squadrons—well, who would say that it was not a wise precaution?

Mr. Lowell Thomas has edited the story of the flight with much judgment. We do not want, and we do not get, long accounts of well-known countries, such as India and France. But lands which are almost unknown to most well-read people, such as the Aleutian Islands and Iceland, are described in considerable detail. Of course, the worst parts of the flight were the two Arctic sections; and so, for more than one reason, the author, or editor, has chiefly expended his descriptive powers upon the North Pacific and the North Atlantic. In fact, Mr. Lowell Thomas has treated his story as a "Travelogue," a story of adventure. Deliberately he emphasises the dangers which were faced and overcome and the hardships which were endured. In doing so, he has aroused the admiration of his readers for the much-enduring heroes who made the flight; at the same time he has emphasised the uselessness of the flight from the point of view of opening up commercial air routes. After reading this book it is impossible to imagine aircraft ever being put to a useful purpose in the fogs and among the mountains and icebergs of the North Pacific. Major Martin crashed there, and the other three aeroplanes were extraordinarily lucky to escape unscathed. That is the only real lesson to be drawn from the flight, and it is a negative lesson. Let the reader, therefore, take this book merely as a book of adventure. It is as thrilling as anything in "Herbert Strang's Annual," and the six—in fact the eight—heroes are paladins indeed.

F. A. DE V. R.

* The First World Flight; being the personal narratives of Lowell Smith, Erik Nelson, Leigh Wade, Leslie Arnold, Henry Ogden, John Harding, written by Lowell Thomas, author of "With Lawrence in Arabia." Hutchinson & Co., Ltd.

Reduction of R.A.F. in Iraq

MATTERS having settled down somewhat in Iraq, and, incidentally, owing to the inauguration of the Cairo-Karachi air service, it has been possible to reduce the R.A.F. in Iraq from eight squadrons to seven, as from November 1. No. 1 Squadron (Sq.-Comdr. Cyril Lowe) of Fighters, stationed at Hinaidi, is being disbanded in Iraq, but will be re-formed next year as one of the Home Defence Squadrons. The original personnel will remain in Iraq to fill vacancies in other units out there.

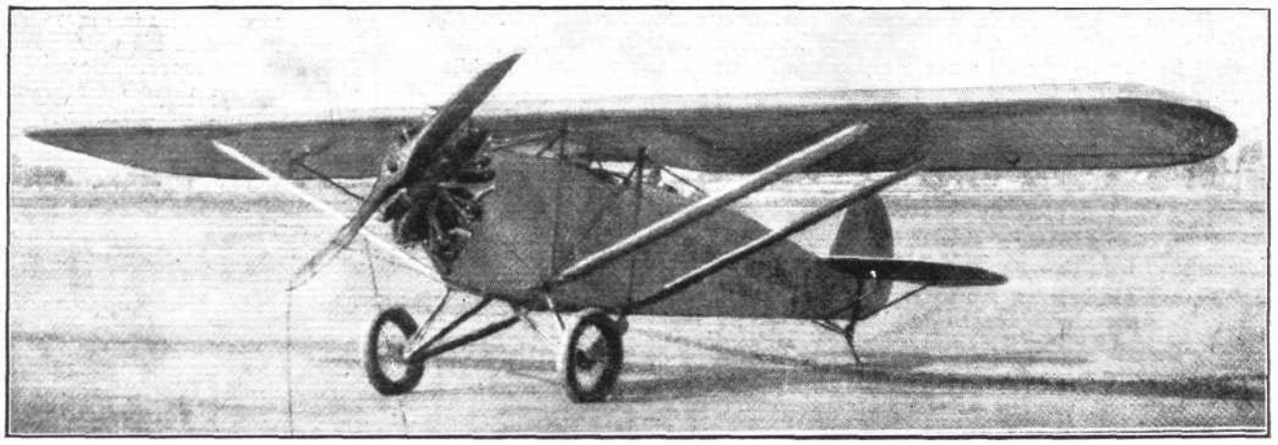
"Alan Cobham, Limited"

IT is reported that a new private company with a capital of £1,000 in £1 shares has been registered under the title of "Alan Cobham Aviation, Ltd.," of which Sir Alan Cobham is a director. The business of the company will be the manufacture of aircraft.

U.S. AIR MAIL SERVICES

Offshoots of the Transcontinental Services

Note.—In our issue for June 10 we gave a list of the ten contract air mail services which have been entered into by the U.S. Post Office Department, consequent upon the decision to extend the U.S. air mail services beyond that of the original Transcontinental route, which has been in successful operation for some years. We give below brief particulars of two of these C.A.M. services, and in a subsequent issue we will refer to the remaining routes. Other articles on this subject appeared in FLIGHT for June 17, July 1, and October 21 last.



U.S. AIR MAIL SERVICES, C.A.M. No. 8: The Ryan "M-1" monoplane, fitted with a 200 h.p. Wright "Whirlwind" engine, which forms part of the flying stock of the Pacific Air Transport, Inc., on the Seattle—Los Angeles route, part of which is flown by night.

C.A.M. No. 8.—Seattle-Los Angeles (1,100 miles)

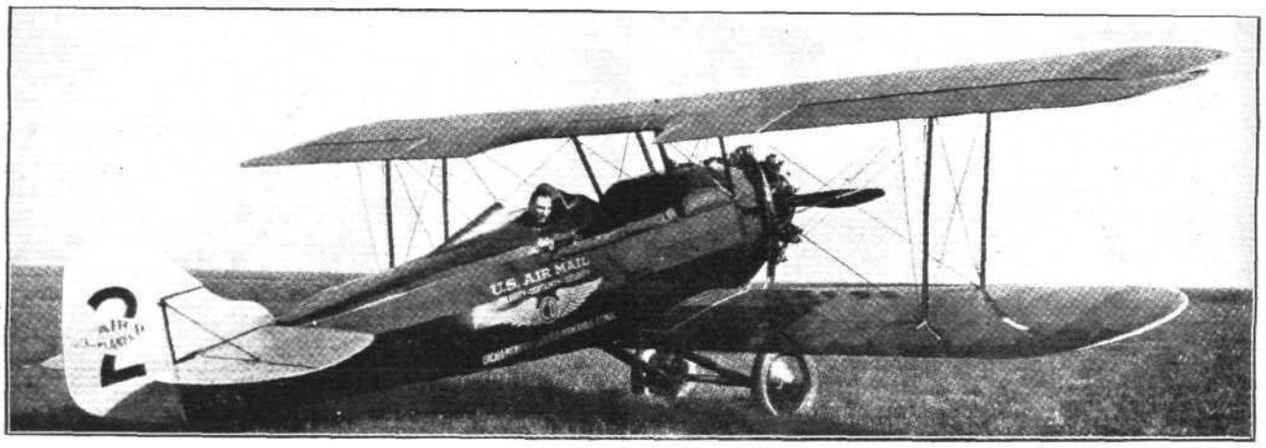
THE Seattle-Los Angeles contract air mail route is the longest (at present) and not the least important of the contract services, the total distance from end to end being 1,100 miles. The contractors for this route are the Pacific Air Transport, Inc., the president of which is Verne C. Gorst, and the vice-president C. N. Comstock.

The route is an extremely important one, since it links up the following big business centres and cities situated along the Pacific coast: Seattle, Portland, Medford, Ore, Sacramento, San Francisco, Fresno, Bakersfield, and Los Angeles. It commenced operations on September 15 last, and it is of interest to note that it is the first of the contract air mail routes to be operated by night as well as day. Night flying beacons, similar to those in use on the night section of the Transcontinental route, have been installed between Seattle and Portland, and San Francisco and Los Angeles, the remainder of the route being flown in daylight.

According to the present schedule, south-bound machines leave Seattle daily (Mondays excepted) at 3.45 a.m., Portland at 5.45 a.m., Medford at 8.15 a.m., San Francisco at 12 noon, Fresno at 2 p.m., Bakersfield at 3.30 p.m., and arrive at Los Angeles at 5 p.m. The north-bound machines leave Los Angeles at 12 midnight, Bakersfield at 1.45 a.m., Fresno at 3.30 a.m., San Francisco at 5.30 a.m., Medford at 9.30 a.m., Portland at 12 noon, and arrive at Seattle at 2 p.m.

This schedule, it should be noted, has been planned primarily to benefit the cities along the Pacific coast route itself, and no attempt has been made to make special connections with the Transcontinental route to the east, as the advantage gained in so doing would be slight compared with advantages afforded by the north and south services of the C.A.M. 8 route as run at present.

As a matter of fact, the schedule as arranged affords a marked improvement over present railway mail; for example, while the mail train leaves Seattle at 4.30 p.m., Monday, arriving at San Francisco 9.10 a.m. and Los Angeles at 7.40 p.m., Thursday, the mail 'plane leaves Seattle at 3.45 a.m., Tuesday (11 hrs. 15 mins. after the train), and arrives at San Francisco at 11.45 a.m. and Los Angeles at 5 p.m. the same day!



U.S. AIR MAIL SERVICES, C.A.M. No. 9: The Laird biplane, fitted with a 200 h.p. Wright "Whirlwind" engine, the type of mail 'plane employed on the Chicago-Twin Cities route by Chas. Dickinson, the original contractor for this service. It is now operated by Northwest Airways with new machines.

The Pacific Air Transport Co. employs eight machines on this route, all of the same type—the Ryan M.1 monoplane. This is a new and highly successful design, manufactured by Ryan Airlines, Inc., of San Diego. It is a high-wing, "semi-cantilever" monoplane possessing several original constructional features, which, however, we cannot detail in this

article, as we propose to give our readers a full description of this machine in a future issue of FLIGHT.

It may be said, however, that, fitted with a 200 h.p. Wright "Whirlwind" engine, the Ryan M.1 carries a pay load of 600 lbs. at a cruising speed of 115 m.p.h. So far these machines have proved very successful on this route.

C.A.M. No. 9—Chicago-Twin Cities (400 miles)

THIS air mail route, which links Chicago with the Twin cities—St. Paul and Minneapolis—via Milwaukee and La Crosse, was originally contracted for by Chas. Dickinson, of Chicago, who commenced operations on June 7 last with a daily service in each direction, using Laird mail 'planes equipped with Curtiss OX.5 and Wright "Whirlwind" engines.

On October 1, however, North-west Airways, Inc., of Detroit, took over the operation of this route, Chas. Dickinson having handed in his notice desiring to discontinue service, and this new company being awarded the fresh contract. Northwest Airways are retaining the original pilots, but are using new machines.

The original contractor stated that he was unable to make the service pay with the small quantity of mail carried over this particular route. Northwest Airways, however, are not only carrying mail alone, but passengers and freight as well, which, together with a more thorough system of organisation, should enable them to carry on with better prospect of success. The route itself should be an extremely useful one, providing as it does two very important cities of the north—St. Paul and Minneapolis—with speedy communication with other parts of the States through the connection at Chicago with the Transcontinental air route, and thence over other contract routes.

As with most other C.A.M. services, the Chicago-Twin Cities schedule is a daily one—Sundays excepted—and originally southbound mails left Minneapolis at 3 p.m., St. Paul 3.10 p.m., La Crosse 4.30 p.m., Milwaukee 6.25 p.m., and arriving at Chicago at 7.15 p.m. North-bound mails left Chicago at 5.50 a.m., Milwaukee 6.50 a.m., La Crosse 8.45 a.m., St. Paul 10.30 a.m., and arrived at Minneapolis at 10.40 a.m. We are unable to say at the moment if the present company operating this service works to the same schedule, but it is probable that modifications have been effected.

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LIGHT 'PLANE CLUB DOINGS

FATAL ACCIDENT AT STAG LANE

London Aeroplane Club

THE accident on Monday last, resulting in the death of the Ground Engineer, J. S. M. Michie, and severe injuries to S. L. F. St. Barbe, the Pilot Instructor, came as a great blow to the club.

The D.H. "Moth" G-EBNP was being tested in the ordinary way before being handed over to the members for solo flying. At the time of the flight, 1.15 p.m., very few people were on the aerodrome, and it is impossible to obtain any reliable information as to what led up to the crash. The result of the Air Ministry enquiry will, it is hoped, be issued shortly.

Michie has been the Ground Engineer since the inception of the club. He has carried out all his duties in such a manner as to win the admiration of all who came in contact with him. He had the implicit confidence of the Pilot Instructors, and all the members, and his loss to the club will be keenly felt. The injuries to St. Barbe are not quite so serious as was thought at first, and he is now making very good progress.

The London Aeroplane Club wish to extend their warmest thanks to all the light aeroplane clubs and members who sent messages of sympathy. The esteem in which Michie was held was exemplified by the large number of messages received from all parts of England.

To the parents of Michie we extend the deepest sympathy. In their great loss it must be a consolation to them to know that their son, by his unassuming manner and his devotion to his work, was beloved by all.

Flying during the past week was confined to Saturday and Sunday, and the total flying time was 10 hrs. 55 mins.

The following members had instruction: H. Spooner, Lieut.-Com. Mackintosh, D. H. P. Esler, E. J. B. King, Miss Fletcher, T. C. Sharwood, J. A. Simson, L. C. Davey, G. L. Gardner, C. E. Murrell, H. Solomon G. Eady.

The following members made solo flights: E. E. Stammers, H. Petre, C. E. Murrell, S. O. Bradshaw, O. J. Tapper, G. H. Craig, A. R. Ogston, Miss O'Brien, W. Hay, A. G. D. Alderson.

The following members had joy rides: G. F. Wilson, R. C. Presland, E. H. Saxon Mills, Miss Johnston.

Christmas Holidays.—The club will be closed down during the Christmas Holidays, from Thursday, December 23, to Thursday, December 30, 1926.

Hampshire Aeroplane Club

REPORT for week ending November 25.—Total flying time, 8 hrs.; instruction flying, 3 hrs. 25 mins.; passenger flying, 1 hr. 20 mins.; solo flying, 3 hrs. 15 mins.

The following members had instruction: Keeping, 1 hr.; Shepherd, 40 mins.; Bound, 25 mins.; Rumble, 20 mins.; Nicholson, 15 mins.; Cooper, 10 mins.; Kerry, 10 mins.; and the Hon. H. R. Grosvenor, 25 mins.

The joy riders were: Miss Fry, Miss Hoare and Mr. Lawrence.

The soloists were: Perfect, 55 mins.; Lieut. Graham, R.N., 30 mins.; Bowen, 20 mins.; Rumble, 20 mins.; Flying Officer Clarkson, 20 mins.; Flying Officer Odbert, 18 mins.; Fry, 15 mins.; Bound, 12 mins.; and Nicholson, 5 mins.

Competition is very keen between several of the soloists who are members of Avro's staff, and during the lunch hour each day there is a sprint race across to the clubhouse to stake claims for Moths. One day last week the Publicity Secretary was disqualified for using a bicycle, which was promptly confiscated. He was heard muttering something about revenge, and it is a notable coincidence that he put one Moth out of action the next day by making a "heavy" landing with consequent damage to the axle and propeller.

Lancashire Aero Club

REPORT for week ending November 27.—The wind having dropped and the rain having stopped, the weather has been perfect—if only one could have seen it. Unfortunately, however, it has been obscured by a dense fog during the greater part of the period.

Total flying time for the week, 20 hrs. 55 mins., made up as follows:—Dual with Messrs. Brown, Cantrill and Scholes:—Messrs. Stern, 1 hr. 45 mins. Twemlow, 1 hr. 10 mins.; Blagden, 1 hr.; Miss Brown, 55 mins.; Messrs. Nelson, 40 mins.; Crosthwaite, Forshaw and Fray, 30 mins. each; Keyes, Leigh and Wade, 25 mins. each; Slater and Dickinson, 35 mins. each; Moore, McNair, Meads, Gattrell, Anderson and Newton, 20 mins. each; Davidson and Harper, 15 mins. each; Michelson, 10 mins.

Solo:—Messrs. Costa, 2 hrs 5 mins.; Lacayo, 1 hr. 5 mins.; Goodfellow, 40 mins.; Williams, 20 mins.; Scholes, 20 mins.; Hardy, 20 mins.; Cantrill, 5 mins.

Joy-rides:—With Mr. Leeming: Mr. Brown, 40 mins.; Wood, 20 mins. With Mr. Scholes: Mr. Leeming, 20 mins.; Wood, 15 mins. With Sir W. S. Brancker: Mr. H. A. Brown, 15 mins. With Mr. Goodfellow: Mr. Bertram, 10 mins.; Blagden, 10 mins. Test flights: 2 hrs. 10 mins.

Lest Capt. Lamplugh should suspect for a moment that we have been flying with a visibility range of less than 500 ft., let us hasten to assure him that during misty weather a Scotch member, armed with a telescope, is placed on the aerodrome at a distance of 501 ft. from a half-crown. If this becomes lost to sight the alarm is immediately raised and all flying ceases.

We were very glad to see the Air Ministry representatives on Tuesday, when Mr. Goodfellow so overwhelmed them with statistics that both the D.C.A. and A.D.C.A. had to take the air after lunch in order to clear their minds. The only sad part of the show was that Yorkshire claimed them for the evening, so that they were unable to stay for the Club supper, which one feels they would have enjoyed. It was very well attended and completely successful, the guest of honour in the D.C.A.'s absence being the Czecho-Liberian air attaché. This gentleman's striking appearance, clad in morning coat, plus fours, dancing pumps and a white beaver fully justified the M.C.'s introductory statement to the effect that "the attaché, ladies and gentlemen, is a bit of a case."

Midland Aero Club, Ltd.

REPORT for week ending November 20.—The total flying time was 2 hrs. 31 mins. A week of very high winds and heavy rain considerably restricted flying.

Mr. J. Brinton made two solo flights, and Mr. H. Smith was given dual instruction. The Austin Whippet was flown twice by Capt. McDonough.

The first Midland Aero Club Dance is being held at the Palace Ballroom, Erdington, on Thursday, December 9, from 8 p.m. to 12 p.m. Tickets, price 5s. each, may be obtained from the Secretary, 22 Villa Road, Handsworth, or from Mr. S. H. Smith, "Windermere," Orchard Road, Erdington, Birmingham. (This week's report unavoidably held over).

The Newcastle-upon-Tyne Aero Club

REPORT for week ending November 21.—Another dismal report. The total amount of flying carried out during the week being 2 hrs. 15 mins.

"LX" is still under repair and "LY" was only put on service on Saturday after engine overhaul.

A little flying was put in on Saturday and Sunday morning. Unfortunately in taking off Mr. Mathews collided with the boundary fence, damaging the machine rather considerably.

Mr. R. N. Thompson flew with Mr. Wilson as passenger, Mr. W. Baxter Ellis with Mr. Turnbull, Mr. C. Thompson with Mrs. Heslop, and Mr. H. Ellis, the Club's newest "A" Pilot, flew alone for half an hour.

Reference to the remarks of the Yorkshire Club in last week's issue. We are glad to say that no lady member of this Club has as yet done anything approaching 60 hrs. instructional flying. We congratulate them on beating our ladies' record of eight hours, which is the shortest time a lady has been under instruction before actually going solo. We wish their Lady Member every success, and hope that this week's report confirms the hopes raised last week.

Report for week ending November 28.—The only flying for the week was 1 hr. 25 mins. on Sunday.

Mr. Parkinson was "launched" for 10 mins. on "LX," which has recently been under repair as regards some small details, and put up quite a good show. His flying was considerably better than that usually performed by one carrying out a first solo flight (as, of course, it ought to be), and he made an excellent landing. He was allowed, after this, to carry on instruction, the first flying he had done for four and a half weeks. The members who had instruction were Mr. Turnbull and Mr. Rasmussen, who each flew for 30 mins.

Mr. Irving flew for 15 mins. solo, but the weather was so bad that he decided not to stay up any longer, although he is very keen to complete the three hours, necessary before he carries out his tests.

Several games of Badminton and a little work on the "Camel" completed the week's work.

There was considerable activity on the engineering side, however, in addition to the repairs to "LX," as "LY" was being dismantled prior to being returned to its birthplace, Stag Lane, for repairs after the crash of last week, though the method employed was rather more gentle than the original operation of a week ago. An ironic touch is given in the receipt of an account for repairs to the damaged fence, but this is not quite such a serious item as that for the repairs to the machine will probably be, fortunately.

The Yorkshire Aeroplane Club.

REPORT for the week ending November 26.—The total flying time was 9 hrs. 15 mins., as follows:—Solo: 5 hrs. 5 mins.; dual, 4 hrs.; and a 10 minutes' test.

Sunday was quite a busy day, and with both machines now in commission, we managed to put in 7 hrs. 20 mins.

The following members flew solo:—Messrs. Dawson, Lax, Mann, Norway and Watson. Messrs. Brown, Gratwick, Little, Mann, Swift, Wilson and Captain Beaumont received dual instruction.

This has been a week of calling to account and setting our house in order. The house, of course, was nothing like in order when the Committee of Inspection arrived; we are now busily thinking of all the things we might have said, and wondering if other clubs are in the same plight.

We wish to take this opportunity of offering our deepest sympathy to the London club upon their accident.

FROM THE FOUR WINDS

R. 33 Makes Further Test

THE British rigid airship R. 33 carried out some further tests at Cardington on November 23. These included trials of the new Cardington mooring mast, parachute drops with special airship parachute harness, and more aeroplane launching tests. With Major Scott in charge, the R 33 left the shed early in the morning and was walked to the mast, and rising to 500 ft., was then hauled in to the mast and secured. The test was quite successful, and the gear worked satisfactorily. The airship was then released from the mast and carried out a short cruise in the neighbourhood, during which one of the two "Grebe" aeroplanes attached to her keel was released, with Sqdn.-Leader B. E. Baker in charge, who made a successful descent. A dummy parachute drop was also made. R 33 then flew to Pulham, and on arrival there Aircraftsman *Dobbs* made a parachute descent with the new parachute harness and the second "Grebe" was released.

Empire Airship Masts

CANADA is already acting on the recommendation of the Imperial Conference that the Dominions should give early consideration to the erection of mooring masts for Empire airships. The plans, etc., of the new mast at Cardington have been sent over to Canada, in order that consideration of the detailed cost of erection may be attended to without delay. Mr. Mackenzie King's promise regarding Canada's mast has, of course, to be ratified by the Canadian Parliament, but it is stated that it is almost certain to go through without difficulty.

Australian Pacific Flight

GROUP CAPT. WILLIAMS, who had to abandon the flight to Samoa after having got as far as Roviana, is returning to Melbourne on the D.H.50 seaplane, and arrived at Samarai, New Guinea, on November 29.

Air Beacon on Mount Etna

PROPOSALS have been made for the erection of a large aerial lighthouse—with one billion or more candle-power lamps—on the top of Mount Etna, at a height of over 10,000 ft. above sea level. It is intended that this beacon should serve as a guide for pilots of commercial or military aircraft flying at night across the Mediterranean. The wind which blows almost constantly over this volcano, will, it is stated, be utilised to contribute towards the power required for supplying the necessary electricity for operating the beacon. It will be remembered that a large aerial beacon has already been erected at Dijon.

U.S. Non-stop Flight Attempt

ON November 23 two U.S. Naval PN10 flying-boats left Hampton Roads in an attempt to make a non-stop flight to Colon, Panama (2,060 miles). PN10 No. 1, however, was forced down in the Caribbean Sea with a broken connecting rod, and the pilot, Lieut. Connell and his three companions, were "rescued" by a U.S. cruiser some ten hours later. The other machine came down off the Isle of Pines with lubrication trouble, but resumed the flight on November 26, and arrived safely at Colon that evening.

Sir Alan Cobham in America

SIR ALAN COBHAM and Lady Cobham arrived in New York on November 25, but unfortunately rough weather prevented him flying from the *Homeric* in the "Moth" seaplane, as originally planned. However, accompanied by Lady Cobham and a mechanic, he taxied towards shore, and was later taken in tow to Battery Point.

An Australian Night Flight

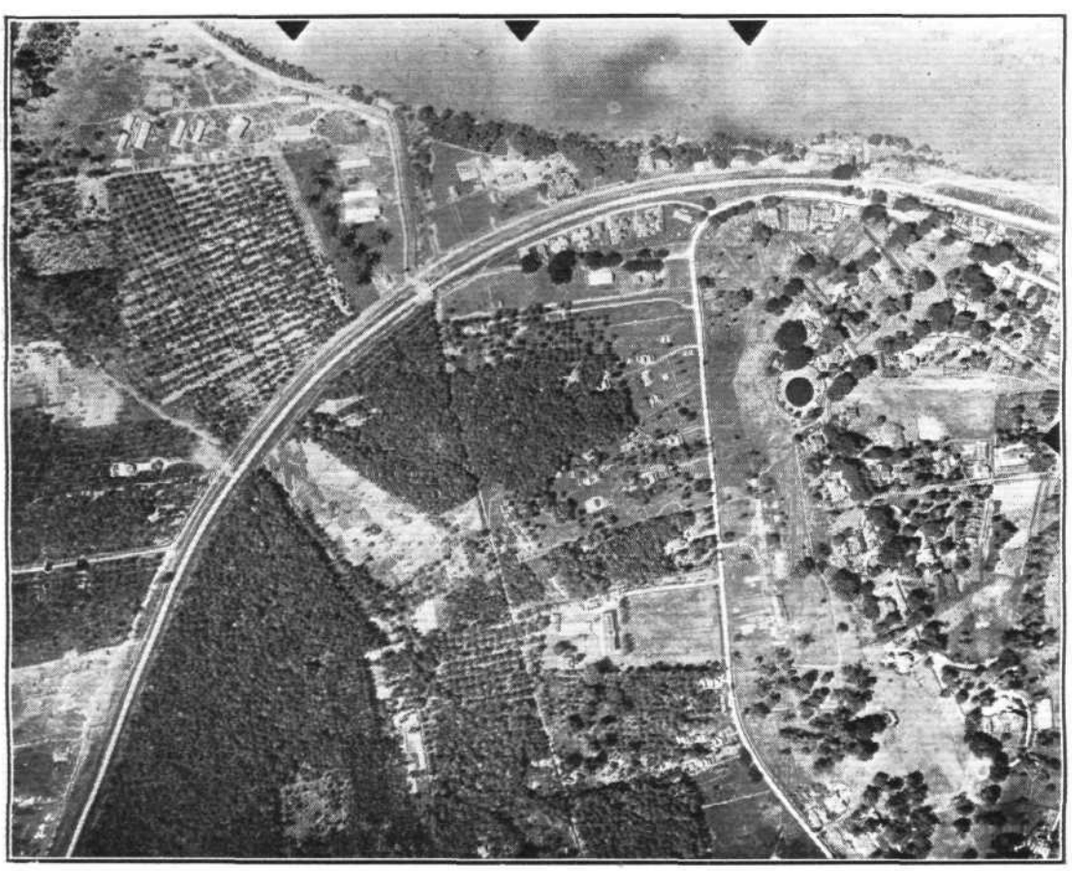
A 400-MILE night flight was accomplished in Australia on November 27 by Sq.-Ldrs. Hepburn and Wrigley, R.A.A.F. They left Richmond, N.S.W., at 8.20 p.m. for Pointcook Aerodrome (Melbourne), but had to land, owing to a leaking petrol tank, at Violet Town (70 miles from Melbourne) at 3.30 a.m.

The "Moths'" Eastern Tour

THE two D.H. "Moths" piloted by Capt. T. N. Stack and Mr. B. S. Leete, are making slow but sure progress eastward. Both pilots reached Marseilles on November 24, and left again for Pisa on the following morning. No doubt as soon as they strike a more reasonable climate they will make up for lost time.

Swiss African Flight

LIEUT. MITTELHOLZER, the Swiss pilot, started on the Dornier seaplane from Zurich on November 28 *en route* for Africa in connection with the scientific research expedition referred to in FLIGHT recenrly. On arriving over the Alps, however, a severe snowstorm compelled him to return to Zurich, and await more favourable weather conditions.



Air Surveying in the East: This photograph, taken by representatives of the Air Survey Co., Ltd., shows, at the top of the picture, a river bank. The regular patch in the top left-hand corner shows a coconut plantation, and below this, on both sides of the railway, are rubber plantations and smaller groups of coconuts. On the right are seen roads, bungalows, and a small water reservoir.

TAYLOR GOLD MEDALLIST DINED

ON November 19 the Institution of Aeronautical Engineers held a dinner at Kettner's Restaurant in honour of Capt. W. H. Sayers for the purpose of presenting him with the Taylor Gold Medal for the best paper read during the session 1925–26. This medal is being presented each year by Capt. G. A. Taylor, F.R.A.S., F.R.G.S., M.I.Ae.E., a member of the Australasian branch of the Institution, and is to be awarded at the discretion of the council to the member who submits or reads the most valuable paper during the session. The first award of the medal has been made to Capt. Sayers for his paper on "The Modern Theory of Aerofoils and its Application to Aeroplane Design," read on June 8, 1926. This paper has just been published in Minutes of Proceedings No. 20 of the Institution.

At the dinner, Mr. R. J. Parrott was in the chair and made the presentation, ably supported by Dr. Thurston, Mr. Hulbert, and Capt. Lamplugh. In making the presentation, Mr. Parrott said that the best thanks of the Institution were due to Capt. Taylor for his generosity in giving this gold medal, which would serve as a common bond between the Institution at home and the branch in Australia. Concerning the paper for which the first award had been made, he felt sure this would prove a valuable addition to what had already been written on the subject.

Capt. Sayers, in responding, said he was very sensible of the great honour that had been conferred upon him. He felt that it should really have been he who should have given a dinner to the Institution, since in compiling the paper he had used the Institution for his own purposes. He hoped that when members had had time to study the paper they would feel that the award was justified.

Dr. Thurston, in proposing the toast of "The Institution of Aeronautical Engineers," recalled that the Institution was "a Society for the encouragement, development, and protection of the profession of aeronautical engineering," and drew attention to the great heritage into which the aeronautical engineer had come. He paid a tribute to the early pioneers of flying, notably to Mr. A. V. Roe, head of that great and honoured company which was represented that evening by Mr. Parrott. Dr. Thurston concluded by paying a warm tribute to Mr. Hulbert for his valuable work as acting Honorary Secretary, to which Mr. Hulbert replied that it was more nerve-racking to have to reply to Dr. Thurston's eulogies than to go with a man on his first solo flight. Referring to the Institution, Mr. Hulbert said it wanted many more members. He did not advocate indiscriminate canvassing, but he hoped all those present would lose no opportunity of bringing home to their friends the advantages of joining the Institution.

Capt. Lamplugh, in proposing the toast of the Chairman, said Mr. Parrott was one of the ruling spirits of probably the most famous aircraft works of all. Concerning Capt. Sayers and the award of the Taylor Gold Medal, he felt that the paper was worth not only this, but a Schneider Cup complete.

The more serious part of the evening having thus concluded, the guests gave a demonstration of the qualities of their under-carriages to the tune of the Kettner Dance Band.

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A REALLY USEFUL MICROMETER

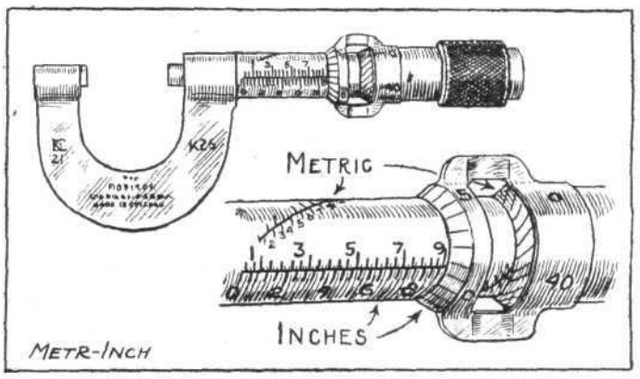
WE recently had the opportunity of inspecting a micrometer designed on entirely original lines which should, we think, fill a long-felt want in all branches of engineering where work is done both in English and metric measurements. It frequently happens that a job entails the reading of measurements in inches for one part, while in another these are in millimetres. Hitherto, the worker has had to possess two separate micrometers, one reading in inches and the other in millimetres, or else has referred to tables of equivalents, or resorted to lengthy calculations—all of which are bothersome methods, where errors and confusion frequently creep in.

With the micrometer referred to above all these troubles are banished in a simple, effective and ingenious manner, for this micrometer gives at a glance a dual reading, both in inches and in millimetres. It must be mentioned at the outset that this direct reading of micrometer indications to English and metric standards of measurements on the same instruments, is *not* accomplished by combining the two scales—English-metric—on the same datum or reading line, as this is obviously a most unsatisfactory procedure, not only as regards producing such a scale with accuracy, but in reading it also.

The Madison-St. Gervais "Metr-Inch" micrometer accomplishes the dual reading in a very ingenious and accurate method, as follows (see also accompanying sketch). In addition to the ordinary calibrated datum line scribed horizontally on the micrometer sleeve, there is another calibrated helical line scribed round the sleeve above it. The former is the inch scale and the latter is the metric scale. Two calibrated rings are provided on the revolving thimble, the front one of which is divided in radial lines so as to coincide with the horizontal or inch scale, whilst the other is divided in tangential lines, to coincide with the helical or metric scale.

In this way it is impossible for there to be any confusion between the two readings, which, furthermore, are easily read. A locking arrangement is, of course, also provided.

Although a French invention, this micrometer is British made, the workmanship and finish being of the best. It has, we understand, been favourably commented upon by the War Office, Admiralty, Air Ministry, and Dockyards. One of these micrometers was tested by the National Physical Laboratory, Teddington, and by them was passed as Grade 1, the report on the test stating that, calibrated for progressive error at 0·1-in. intervals over the 1-in. run of scale, the errors at 62° F. were found to be within 0·0001 in. and 0·003 mm. on the two scales. The periodic error was investigated over complete revolutions at three positions along the screws, and in each case the errors found were within 0·00005 in. and 0·002 mm. When the faces of the micrometer are in contact the zeros of the two scales are correct to 0·0001 in. and 0·002 mm. respectively.



A COMBINATION INCH-METRIC MICROMETER: The above sketch shows a useful micrometer, the Madison-St. Gervais "Metr-Inch," which gives simultaneous readings in both English and metric measurements. The enlarged view shows the arrangement of the dual scales—0 to 1 in.

This micrometer should, therefore, form a valuable part of the equipment of every aircraft or engine factory, not only on the score of saving time, but money, for we understand that the price of this micrometer is only slightly more than the average price of an ordinary micrometer.

Further particulars regarding the "Metr-Inch" micrometer may be obtained from Messrs. Madison-St. Gervais, 26-27, St. Stephen's House, Westminster, S.W.1.

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A Kiel-Thames Air Service?

ACCORDING to our contemporary *Airways*, Kiel Canal and the Thames may shortly be linked by a regular air service. It is stated that plans have already been prepared by the German authorities for a flying-boat service between the Kiel Canal and the mouth of the River Thames. This line, which is scheduled to start next spring, will be operated by twin-engined 1,400 h.p. Dornier flying-boats, providing accommodation for twenty-one passengers in two separate cabins.

NOTICE TO AIRMEN

Procedure for Obtaining Single Bearings By D.F. W/T

As a trial measure, the procedure described in paragraph 35A of the Air Pilot Appendix, Part II, page 12A, hitherto applied only to aircraft of Imperial Airways, Ltd., will henceforth be available for all aircraft flying in the vicinity of the London-Continental route. The following procedure is therefore temporarily substituted for that outlined in paragraphs 35 and 35A, Air Pilot Appendix, Part II :—

The procedure, when using R/T, for an aircraft desiring to obtain a *single* bearing from Croydon, Pulham or Lympne, is as follows :—

Two types of bearings are given according to the form of the request—

A. The true bearing of the aircraft from the D.F. station.
B. The magnetic bearing of the D.F. station from the aircraft.

Examples

A. Aircraft F-FHMU wishes to obtain its *true* bearing from Lympne—

1st Action

Aircraft F-FHMU calls Lympne and asks for its bearing :—

" Hullo Lympne, Air Union F-FHMU calling, aircraft true bearing required, aircraft true bearing required, over."

2nd Action

Unless Lympne has already obtained a satisfactory bearing, that station replies :—

" Hullo Air Union F-FHMU, Lympne answering, Righto, Righto, speak for half minute, speak for half minute, over."

3rd Action

The aircraft then speaks for half a minute, remembering that Lympne is paying no attention to the actual words and might not, therefore, hear if anything of importance was passed.

4th Action

Lympne replies :—

" Hullo Air Union MU, Lympne answering, aircraft true 110 at 1509, aircraft true 110 at 1509, over."

5th Action

The aircraft replies :—

" Hullo Lympne, Air Union MU answering, understand aircraft true 110 at 1509, understand aircraft true 110 at 1509, over."

6th Action

Lympne replies :—

" Hullo Air Union F-FHMU, Lympne answering, that is correct, that is correct, switching off."

B. Aircraft F-FHMU desires to obtain Croydon's *magnetic* bearing from the aircraft.

NOTE.—After applying deviation and allowing for drift this bearing gives the course to fly to reach Croydon. The word " course " should not be used in asking for this type of bearing.

1st Action

Aircraft F-FHMU calls Croydon, and asks for Croydon's magnetic bearing :—

" Hullo Croydon, Air Union F-FHMU calling, Croydon magnetic bearing required, Croydon magnetic bearing required, over."

2nd Action

As in " A " with the substitution of " Croydon " for " Lympne."

3rd Action.

As in " A " with the substitution of " Croydon " for " Lympne."

4th Action

Croydon replies :—

" Hullo Air Union MU, Croydon answering, Croydon magnetic 295 at 1413, Croydon magnetic 295 at 1413, over."

5th Action

The aircraft replies :—

" Hullo Croydon, Air Union MU answering, understand Croydon magnetic 295 at 1413, understand Croydon magnetic 295 at 1413, over."

6th Action

As in " A " with the substitution of " Croydon " for " Lympne."

(*No.* **76** *of* 1926).

ROYAL AERONAUTICAL SOCIETY

(*Official Notices.*)

Lecture.—The fifth lecture of the first half of the Sixty-Second Session will be held today, December 2, at 6.30 p.m., at the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, when Mr. P. B. Henshaw will read a paper on " Valve Steels." Colonel the Master of Sempill, A.F.C., Associate Fellow, will preside.

The composition and behaviour of Valve Steels is one of great importance in view of the higher engine efficiencies which are being demanded. Mr. Henshaw deals in his paper with the various properties of Valve Steels at present in general use and suggests the lines along which advances are possible.

Many important tables and curves of test results recently carried out are given in the paper, and in particular the properties of nickel chrome steels are dealt with in detail. It is pointed out that nickel chrome steel possesses advantages which are worthy of close consideration.

Students' Section.—The Inaugural Meeting of the 1926-27 session was well attended by an enthusiastic audience. Mr. F. Handley Page, C.B.E., Fellow, gave an address on " The Future of Aviation." Lieut.-Colonel I. A. E. Edwards, C.M.G., took the chair, and presented to Flying Officer R. Linton Ragg, R.A.F., the Pilcher Memorial Prize, and the cash prize given by Lieut. R. V. de Aboim, B.N., which the Council had unanimously awarded to his paper " Experimental Flying from the Pilot's Point of View."

The following programme has been arranged :—

Saturday, December 4, 10.0 a.m. Visit to Messrs. D. Napier & Son, Ltd., Acton. (Number visiting limited to 10).

Thursday, December 9, at 7.0 p.m. in the Library. Students' Section Lecture and Discussion on " The Possibilities of the Two-Stroke Cycle for Aircraft Engines," by Mr. C. G. L. Hutchinson. Wing Commander T. R. Cave-Browne-Cave, C.B.E., Fellow, in the Chair.

Saturday, December 18, 10.0 a.m. Visit to the Hawker Engineering Co., Ltd.

R.38 Memorial Prize.—Members and others are reminded that the closing date for the receipt of names of entrants for the R.38 Memorial Prize, 1927, is December 31. The prize is offered annually for the best paper received by the Society on some subject of a technical nature in the science of aeronautics. Other things being equal, preference will be given to papers which relate to airships. The prize is open to international competition and is of the value of twenty-five guineas. A copy of the Regulations can be obtained from the Secretary.

J. LAURENCE PRITCHARD,
Hon. Secretary.

Royal Aero Club Monthly House Dinner

THE next monthly house dinner of the Royal Aero Club will be held at the Club on Wednesday, December 8, at 7.15 p.m., when a discussion will be opened by Mr. C. R. Fairey. The chair will be taken by Lord Thomson.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the fund was held at Iddesleigh House on November 18. Lieut.-Comdr. H. E. Perrin was in the chair, and the other members of the Committee present were : Mrs. L. M. K. Pratt-Barlow, O.B.E. ; Mr. W. S. Field ; Sqdn.-Ldr. Douglas Iron, O.B.E. The Committee considered in all 16 cases, and made grants to the amount of £204. The next meeting was fixed for December 2, at 2.30 p.m.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, November 23, 1926.

General Duties Branch

The follg. Pilot Offrs. are promoted to rank of Flying Officer :—J. W. M. Nancarrow (Oct. 14) ; J. H. C. Purvis (Oct. 17) ; H. A. M. Weir (Oct. 31). Flying Offr. G. C. A. Armstrong is secd. for serv. as A.D.C. to the Governor of South Australia (Nov. 13). Flying Offr. S. A. Lane is transferred to Reserve, Class A (Nov. 22). The follg. Flying Offrs. relinquish their temp. commns, on return to Army duty :—H. A. Crommelin (Lt., Duke of Wellington's R), (Nov. 6) ; E. V. H. Hudson (Lt., Middx. R.) (Nov. 20).

Stores Branch

Flying Offr. on probation P. Alderson is confirmed in rank (Nov. 8) ; Flight Lt. A. Latimer is dismissed the service by sentence of General Court-martial (Nov. 8).

Accountant Branch

Flight-Lt. S. G. Linssen is placed on the retd. list on acct. of ill-health (Nov. 24).

Medical Branch

Flight-Lt. P. A. Hall, M.B., is promoted to rank of Squadron Leader (Nov. 26) ; Flying Offr. J. Parry-Evans is promoted to rank of Flight-Lt. (Nov. 19) ; temp. Capt. J. R. Williams, General List (Army), Dental Surgn., is granted a temp. commn. as Flight-Lt. (Nov. 2). He will continue to receive emoluments from Army sources. Flight-Lt. J. S. Smith (Capt., Army Dental Corps) relinquishes his temp. commn. on return to Army duty (Nov. 1).

Reserve of Air Force Officers

Flying Offr. C. J. Clark ceases to be emplyd. with the Reg. Air Force (Nov. 21). The follg. are transfd. from Class A to Class C :—Flight-Lt. W. N. Cumming (Sept. 5) ; Flying Offr. C. Duttson (June 19). Flying Offr. W. J. Hutchinson, M.B., is transfd. from Class D2 to Class D1 (Nov. 12).

The follg. Offrs. relinquish their commns. on completion of service :—Flying Offr. K. W. Brewster, M.C. (Aug. 28) ; Flight-Lt. A. Roberts, Flying Offr. S. L. Cannon, Flying Offr. P. A. Cockeram, M.C., Flying Offr. A. V. Gash, Flying Offr. B. J. Paget, Flying Offr. W. P. Woodcock (Oct. 24) ; Flying Offr. M. H. McErlean, Flying Offr. H. Wisnekowitz, M.C. (Nov. 8) ; Sqdrn. Leader T. S. Impey (Nov. 11) ; Flying Offr. E. G. King (Nov. 22).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 CITY OF LOND. (BOMBING) SQDRN.—Sqdrn. Leader (Hon. Wing Comdr.) A. W. H. James, M.C., resigns his commn. (Nov. 19).

To be Sqdrn. Leader.—Captain the Right Hon. F. E. Guest, P.C., C.B.E., D.S.O., M.P., to comd. the sqdrn. (Nov. 19).

The follg. to be Pilot Offrs. :—No. 601 COUNTY OF LOND (BOMBING) SQDRN.—R. I. Forbes-Leith (Aug. 17). No. 600 CITY OF LOND. (BOMBING) SQDRN.—J. C. Larking (Nov. 23). No. 605 COUNTY OF WARWICK (BOMBING) SQDRN.—C. L. Knox, V.C. (Nov. 23).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Air Commodore : E. L. Gerrard, C.M.G., D.S.O., to R.A.F. Depot, Uxbridge pending posting on transfer to Home Estabt., 25.10.26.

Group Captains : U. J. D. Bourke, C.M.G., to H.Q., Wessex Bombing Area, Andover, for Air Staff duties, 22.11.26. Hon. J. D. Boyle, C.B.E., D.S.O., to Station H.Q., Worthy Down, to Command, 1.12.26.

Wing Commanders : J. H. Herring, D.S.O., M.C., to No. 2 Flying Training Sch., Digby, pending taking over command, 1.12.26. W. G. P. Young, O.B.E., to Air Ministry (Directorate of Equipment), for duty as R.A.F. Representative on Board of Management, Navy, Army and Air Force Institutes, 22.11.26.

Squadron-Leaders : A. Lees to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 21.11.26. B. F. Moore to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 17.10.26. R. P. Willock to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 4.11.26.

Flight-Lieutenants : C. E. W. Foster to No. 406 Flight, Donibristle, on transfer to Home Estabt., 6.10.26. E. H. Bryant to R.A.F. Training Base, Leuchars, on transfer to Home Estabt., 16.10.26. E. S. Moulton-Barrett to, R.A.F. Training Base, Leuchars, on transfer to Home Estabt., 13.10.26. M. L. Taylor, A.F.C., H. M. K. Brown, W. A. K. Dalzell, G. E. Wilson, H. W. Baggs, J. H. Winch, J. D. S. Denholm, F. G. Gibbons, D.F.C., and H. Norrington to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 4.11.26. J. McG. Fairweather, D.F.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 17.10.26.

Flying Officers : (Hon. Flight-Lieut.) K. M. Murray to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 28.8.26. J. H. Caulfield to No. 1 Flying Training Sch., Netheravon, 1.12.26. A. E. B. Bateman to R.A.F. Station, Donibristle, on transfer to Home Estabt., 6.10.26. T. J. E. Thornton and G. P. Mee to R.A.F. Depot, Uxbridge (Non-effective Pool), on transfer to Home Estabt., 17.10.26. A. E. Rogenhagen, L. Butler, C. H. A. Farnan and F. B. Young to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 17.10.26. R. H. Giles to No. 503 Sqdn., Waddington, on transfer to Home Estabt., 17.10.26. H. S. Dawe to No. 1 Sch. of Tech. Training (Apprentices), Halton, on transfer to Home Estabt., 17.10.26. H. C. Gammon, R. Tuck, J. M. Wyer, M.B.E., D.S.M., H. D. Wardle, R. R. Greenlaw, M.B.E., and E. E. Arnold, D.F.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 4.11.26. E. A. Hodgson and E. V. S. Lacey to R.A.F. Depot, Uxbridge (Non-effective Pool), on transfer to Home Estabt., 4.11.26.

Stores Branch

Squadron-Leaders : P. Adams, O.B.E., and F. Grave, M.B.E., to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 17.10.26.

Flight-Lieutenants : F. J. W. Humphreys to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 17.10.26. F. J. B. Powell, M.B.E., to Station H.Q. Bircham Newton, on transfer to Home Estabt., 4.11.26.

Flying Officers : R. W. Stevenson and D. W. Dean to R.A.F. Depot, Uxbridge, on transfer to Home Estabt., 4.11.26.

NAVAL APPOINTMENTS

The following appointments were made by the Admiralty on November 27:—

Comdr. R. Ramsbotham, lent to Air Ministry, 18.12.26 ; and for duty with Directorate of Instruments, 24.12.26.

Lieutenants (Flying Officers, R.A.F.) : P. D. Oliver (E.), to *Hermes* and for full flying duties in 440 flight ; J. N. Sparks and C. N. Lentaigne, to *Hermes* and for full flying duties in 440 flight, previous orders cancelled ; A. N. Gray and S. T. Morgan, to *Eagle* and for full flying duties in 423 flight, 18.9.26.

Royal Air Force

Flight-Lieut. E. Brewerton, to *Hermes* for full flying duties in 440 flight, 18.9.26.

Flying Officers : G. E. Nicholettes, to *Hermes* and for full flying duties in 440 flight ; and C. F. Brewerton, to *Eagle* and for full flying duties in 423 flight, 18.9.26.

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IN PARLIAMENT

Southampton-Cherbourg Airway

COLONEL DAY, on November 24, asked the Secretary of State for War what steps had been taken with the French authorities with a view to the extension of the airway between Southampton and the Channel Islands to Cherbourg ?

Sir Samuel Hoare : The question of extending the British regular air service between Southampton and Guernsey to Cherbourg is primarily a matter for consideration by Imperial Airways, Ltd. Occasional flights are, however, undertaken to Cherbourg, and the question whether the special prior permission now required for each such flight, Cherbourg being within a "prohibited area," could not be dispensed with, is at present under discussion with the French authorities.

Colonel Day : Is it not the fact that it would save a day in coming from America to England, or *vice versa*, if this service were established ?

Sir S. Hoare : It would certainly save a considerable time in the transport of American mails, but exactly how long I could not say without notice.

Airship R.33

MR. WELLS asked if it was proposed to dismantle the airship R.33 ; and, if so, what steps will be taken to train crews for the airships under construction?

Sir S. Hoare : The answer to the first part of the question is that there is no present intention of dismantling R.33, and the second part does not, therefore, arise.

Mr. Wells : Did the recent trials of this vessel show her to be airworthy or not ?

Sir S. Hoare : The recent trials were not made with the object of proving the R33 to be airworthy, but with the object of making certain other tests. The trials have been successful in so far as those tests are concerned.

Light Aeroplane Clubs Subsidy

LORD APSLEY asked the direct result of the subsidisation of light aeroplane clubs ; and whether there were any statistics showing the present numbers of amateur flyers and amateur-owned planes ?

Sir S. Hoare : As regards the first part of the question, there are now six subsidised light aeroplane clubs in existence, with a total of 982 members and associates ; of these, a large number are under training as pilots, and 44 have already trained and qualified on club aircraft. A number of these pilots have already joined the Air Force Reserve or the Auxiliary Air Force. As regards the last part of the question, there were, on November 1, 117 private pilots' licences held by persons other than serving Royal Air Force officers, and 33 privately-owned aeroplanes were on the register.

Hyde Park as an Aerodrome

LORD APSLEY asked the Secretary of State for Air if he would consider the creation of a small aerodrome in Hyde Park for the benefit of light aeroplane taxi companies or clubs, having regard to the impetus such a measure would give to flying owing to the convenience it would afford to business men, officials, and others to whom quick access to the centre of the Metropolis is all important ?

Sir S. Hoare : My noble friend's suggestion has already been considered by the Air Ministry, but under present conditions of flying Hyde Park is not considered suitable for the purpose suggested, owing to the proximity of high buildings and trees and its densely populated surroundings.

Airship R.100 Payments

MR. VIANT asked to what company, and for what airship, was the sum of £60,000 paid during 1925 and the £30,000 in this year's Estimate ?

Sir S. Hoare : I assume the hon. member is referring to the amounts of £60,000 and £30,000 appearing for "Purchase of Airships" at page 30 of the Air Estimates, 1926. Both were taken for payments to the Airship Guarantee Co., Ltd., for the purchase of the R 100. The former sum, though estimated for, was not earned and no payment was actually made in 1925. As regards the latter sum, it is expected that an instalment of £30,000 will mature for payment under the contract before the end of the present financial year.

Royal Air Force Accidents

MR. ROBINSON, on November 25, asked the Secretary of State for Air the number of non-commissioned officers and men who have lost their lives in accidents to aircraft since January 1, 1926 ; and whether he is satisfied that due precautions are taken before airplanes and pilots are allowed to ascend ?

Sir S. Hoare : The answer to the first part of the question is 28. In addition three naval or marine ratings lost their lives in Royal Air Force accidents, and one airman was killed by being struck by an aeroplane whilst he was working on the ground. As regards the second part, I am satisfied that every precaution is taken. A complete system of inspection of aircraft is in force. All pilots pass a series of thorough tests before they are allowed to fly solo, and again before they are allowed to carry a passenger. Their flying is also continually watched and supervised by their senior officers. For futher information in regard to the measures taken to prevent accidents I would refer to the reply which I gave to Colonel Gretton on November 22.

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

(*Editor of "The Stamp Collector"*)

Madrid-Manila Flight Trophies

SOME interesting relics have been added to the air post collection as a result of the sensational flight from Madrid to Manila by the Spanish airmen Gallarza and Loriza in May last. Besides official messages of greeting addressed to the Kings and Queens of Spain and England and to the Prince of Wales, letters were picked up by the aviators at various points *en route* as follows :—16 from Madrid, 44 from Calcutta, 15 from Bangkok, 59 from Macao, 2,514 from Aparri (P.I.), and 81 from Pamanga (P.I.). These were handed over to the postal authorities on arrival at Manila on May 13, 1926, when specially prepared postmarks were applied to the covers, one showing an aeroplane in conjunction with the Arms of Spain, U.S.A. and the Philippines, and inscribed "RAID MADRID—MANILA" beneath ; and another (also in the form of an aeroplane) lettered on the 'planes "MADRID TO MANILA FLIGHT" accomplished by Spanish Aviators—MANILA–Philippines Islands, May 13, 1926."

In addition, authority was given for a supply of contemporary postage stamps to be overprinted in honour of the occasion with the device of an aeroplane radiator and propeller surrounded by the words "Air Mail—1926 : Madrid–Manila." These stamps were affixed to the mail brought by the Spanish aviators prior to delivery, and were also sold as souvenirs in mint condition. According to an official declaration, the total numbers thus overprinted of each denomination were :—

2	cents, green	10,000
4	,, red	9,000
6	,, violet	5,000
8	,, brown	5,000
10	,, blue	5,000
12	,, orange	4,000
16	,, olive	4,000
20	,, orange	4,000
26	,, blue-green	4,000
30	,, grey	4,000
1	peso, violet	2,000
2	pesos, purple	900
4	,, blue	700
10	,, green	500

The cliches are said to have been destroyed after the foregoing numbers had been overprinted.

The memory of the Madrid–Manila flight will be further perpetuated by the reproduction of a map of the route followed with a picture of the seaplane, inset upon certain charity-cum-postage stamps to be sold by Spanish post offices in aid of the Red Cross on September 15 to 17, in the denominations 15 centimos blue and orange, 20 centimos red and green, 30 centimos brown and blue, and 4 pesetas mauve and red.

Palos–Buenos Aires Flight Stamps

Another famous Spanish flight, that of Capt. Franco from Palos to Buenos Aires earlier in the present year is likewise commemorated by some special air post stamps to be issued on behalf of the Spanish Red Cross, concurrently with the above. They depict the seaplane "Plus Ultra," and are of the face values 5 centimos black and mauve, 10 centimos blue and black, 25 centimos red and black, 50 centimos orange and black, 1 peseta black and green.

New Canadian Air Post

Early in July a new contract air mail service was put in operation between Sioux Look-out and Red Lake, Ontario, with extensions to Woman Lake and Buch Lake areas, by the Patricia Airways and Exploration, Ltd. (Canada). The first mail flight to Red Lake took place on July 7, and to Woman Lake on August 2, 1926. Special cachets were used on these occasions in the form of a maple-leaf with appropriate inscriptions, and struck in green ink. Distinctive vignettes are also on sale at post offices in Ottawa, Toronto, Montreal, Winnipeg, Hamilton, Sunbury, North Bay, Cobalt, Tennis Kaming, Hailebury, Sioux Look-out and Red Lake, lithographed traverse rectangular format in a design by Mr. A. J. Agate, depicting the Curtiss aeroplane "Lark," which made a notable flight from New York to Red Lake in March last, flying over a wild landscape, and inscribed with the name of the operating concern at the top and "SPECIAL LARK DELIVERY—SIOUX LOOK-OUT TO PINE RIDGE AND RED LAKE" below. (Pine Ridge is the capital of the new province of Patricialand.) There are two varieties, printed in small sheets of eight, viz., red, green and yellow (25 cents), and red and blue-green (50 cent.). It is understood that the Elliot–Fairchild service continues to function thrice weekly between Rouza and Hailebury.

PUBLICATIONS RECEIVED

The Parachute "Salvator." S. A. Brevetti Aeronautici "Freri-Furmanik-Calabi," Via in Lucina 15, Rome.

Aeronautical Research Committee Reports and Memoranda : No. 1030 (*Ae.* 223).—Experiments with a Family of Airscrews, Including Effect of Tractor and Pusher Bodies, Part IV. : On the Effect of Placing an Airscrew in Various Positions within the Nose of a Streamline Body. By H. Bateman, H. C. H. Townend, and T. A. Kirkup. Feb., 1926. Price 1*s.* 3*d.* net. *No.* 1034 (*Ae.* 227).—The Efficiency of an Airscrew. By H. Glauert. May, 1926. Price 9*d.* net. *No.* 1040 (*Ae.* 229).—The Accuracy of the Vortex Theory of Airscrews in the Light of Recent Experimental Work and Its Application to Airscrew Design. By H. Glauert and C. N. H. Lock. June, 1926. Price 9*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

U.S. National Advisory Committee Reports. No. 239. Power Output and Air Requirements of a Two-stroke Cycle Engine for Aeronautical Use. By C. R. Paton and Carlton Kemper. *No.* 242. Characteristics of a Twin-float Seaplane During Take-off. By John W. Crowley, junr., and K. M. Ronan. *No.* 244. Aerodynamic Characteristics of Airfoils.—IV. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Technical Notes. No. 246. Test of a Model Propeller with Symmetrical Blade Sections. By E. P. Lesley. September, 1926. *No.* 247. The Drag of Airships. By Lieut. C. H. Havill, U.S.N. September, 1926. The National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

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AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations* : Cyl. = cylinder ; i.c. = internal combustion ; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1925

Published December 2, 1926

14,563. J. B. STRAUSS. Mooring devices for airships. (260,648.)
23,412. ARMSTRONG SIDDELEY MOTORS, LTD., S. M. VIALE and H. TOWNS. Screw propellers. (260,725.)
24,064. H. JUNKERS. Means for measuring altitude of aircraft. (249,069).

APPLIED FOR IN 1926

Published December 2, 1926

2,557. SCHNEIDER ET CIE. and J. FIEUX. Gyroscopic apparatus for providing stabilized platforms on aircraft, etc. (250,535.)
3,023. L. CHAUVIERE and G. MICHEL. Metal propeller. (252,121.)

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